THE

GEOGRAPHICAL MAGAZINE.

JUNE, 1877.

THE ARCTIC EXPEDITION.

XV.

Work of the Auxiliary Sledge Parties.

(*First Part.*)

In our number for December 1876 we gave an account of the autumn travelling, and of the work of the extended sledging parties in the spring, which constituted the principal achievements of the Arctic Expedition and ensured its success; while in our number for April 1877 Captain Hamilton furnished extracts from the journals, showing what unparalleled hardships and sufferings were endured by those who so nobly performed this difficult service. We also touched upon the work done by the depôt parties acting as their supports. The admirable organisation that secured the discoveries to the eastward and westward of the winter-quarters, the advance to the most northern point ever reached by man, and the thorough scientific examination of the newly-discovered region, was based on experience acquired in former expeditions, and was very complete in all its parts. Each party that was despatched from the ships formed a necessary portion of a well-devised scheme to secure the many useful results, for the acquisition of which the Expedition was fitted out. The most important and grandest work was accomplished by the gallant extended parties of whose deeds we have treated in former numbers. It remains to furnish our readers with a record of the useful aid given by the auxiliary sledging parties led by the junior, but not less zealous and equally resolute officers of the Expedition.

The work of the auxiliary parties was to keep open communications, to pioneer, to carry out succour, and to explore, with a view to making collections and discoveries at shorter distances from the ships than would be reached by the extended parties. This work, useful and important in itself, and essential to the general success, formed an admirable training for the young officers who performed it, and who thus acquired experience which has qualified them, in their turn, to lead expeditions, and has formed them into a younger generation of Arctic experts.

The first service of the auxiliaries was one of no slight difficulty. It was to open communication between the 'Alert' and the 'Discovery' as early as possible after the return of the sun,—during a time when the mean temperature was — 30 and the minimum — 45. The heroes of this memorable exploit were Lieutenants Egerton and Rawson, with H.M. sledge 'Clements Markham' and nine dogs. They were accompanied by the Danish dog-driver, Neil Christian Petersen, and left the 'Alert' on the 12th of March.

Lieutenant Egerton tells his own story so well that we shall, for the most part, quote from his report; and our readers will thus receive an accurate and, at the same time, a vivid impression of the character of the work, and of the admirable conduct of the two young officers, who succeeded in saving the life of their unfortunate comrade.

On the first day they made 10 miles over hard snow, and all went well; but on the 13th there was a great alteration in the nature of the ice. The enormous floe-bergs which, from the winter-quarters to this point fended off the other pack, here ceased, and their place was occupied by a wall of smaller hummocks. The cliffs came down perpendicularly to the water, and a drift had formed at the bottom so steep and slippery that they had to cut channels in it for the sledge-runners, embedding the pickaxes and shovels to leeward, in order to hold the sledge if it came out of the channels. In that case it would have gone over a drop of from 20 to 30 feet on to the floe beneath.

Petersen had been frequently frost-bitten, and was becoming very ill on the 13th, and on the 14th a strong wind made it almost impossible to travel, and he became worse. After anxious consultation, Egerton and Rawson decided that it was quite out of the question he could go on, and that they must take him back to the ship as quickly as possible. But there being too much wind to travel, they encamped under Arthur's Seat, and began to make a hut in which to pass the night.

"This we did by digging a hole about 6 feet by 4, and 6 deep, down in the drift, then undercutting it about 4 feet, making it 8 feet square, and 4 feet high inside. We then covered the hole over with the sledge, and, as soon as Petersen was removed into it, with the tent. This took us six hours to complete.

"At luncheon time, as he said the pemmican disagreed with him, we gave Petersen a little 'hoosh,' made from the preserved meat, which we had for the dogs. The liquid part of this he drank, but would not eat any of the meat. About 6 P.M. he was very bad, this time worse than before; there appeared to be no heat in him of any kind whatever, and he had acute pains in the stomach and back. We chafed him on the stomach, hands, face, and feet, and when he got rather better, wrapped him up in everything

warm we could lay our hands on, at the same time giving him 40 drops of sal volatile and rum, which appeared to be the only thing that did him any good. He was constantly calling for cold water, and we gave him a little now and then, but we did not think that much cold water could be good for a man who was so intensely cold, and had an empty stomach. We lit up the spirit lamp to raise the temperature, and as every crevice where an atom of air could get in was carefully closed, the atmosphere in the hut became somewhat thick; but we only succeeded in getting the temperature up to + 7. Later on we got the patient to take a little tea and biscuit, which, however, he soon vomited. We were constantly asking if he was warm in his feet and hands, to which he replied in the affirmative, but before making him comfortable for the night we examined his feet and found them both perfectly gelid and hard from the toes to the ankles, his hands nearly as bad. So each taking a foot, we set to work to warm them with our hands and flannels. As each hand and flannel got cold, we warmed them about our persons, and also lit up the spirit lamp. In about two hours we got his feet to, and put them in warm foot gear, cut his bag down to allow him more room to move in it, and then wrapped him up in the spare coverlet. His hands we also brought round, and bound them up in flannel wrappers, with mitts over all. Shortly after I found him eating snow, which we had strictly forbidden once or twice before. In endeavouring to do this again during the night, he dragged his feet out of their covering, but only a few minutes could have elapsed before this was detected by Lieut. Rawson, who, upon examining his feet, found them in much the same state as before. We rubbed and chafed them again for over an hour, and when circulation was restored (he could then bend all his toes and the joints were moveable), wrapped him up again and gave him a little cold water, for which he was begging, and he then appeared to go off to sleep; but his breathing still continued very short."

"Next day (March 15th) we began to get breakfast ready soon after 5 A.M. Petersen appeared to be rather better, though he was not fit to travel; but, thinking that it was preferable to run the chance of taking him as he was, and that by waiting he might only get worse, we determined to return to the ship. At 8 o'clock we were under weigh, taking the tent, lower robe, coverlet, sleeping bags, and one day's provisions with us (all the sugar, tea, and chocolate, and spirits of wine), and leaving behind the spare coverlet, dogs' food, and all the gear we could dispense with, covering the hut over with the sail, and leaving a staff to mark the place.

"With some assistance, and a dose of 30 drops of sal volatile and a little rum, Petersen was able to get over the first portion of the journey, which was the worst, and as soon as we got decent travelling we lashed him on the sledge and covered him over with the robes. His circulation was so feeble that his face and hands were constantly frost-bitten, entailing frequent stoppages whilst we endeavoured to restore the affected parts by application of our warm hands.

"The poor man complained considerably of cramp in the legs, but, much to our regret, we could not afford time to stop the sledge, as it appeared to us a matter of vital necessity not to lose a moment in placing him under medical supervision. At 10 o'clock we stopped for tea, which Petersen drank, but threw up, and after thawing his nose and hands, and securing him on the sledge, we again set off. On arriving at the Black Cape, we had to take the patient off the sledge, and while one assisted him round, the other kept the dogs back, which by this time knew they were homeward-bound, and it gave us no small amount of trouble to hold them in. After getting the sledge round and restoring Petersen's hands and nose (which were almost as bad again a few minutes after), and securing him on the sledge, we again set off. At Cape Rawson the same difficulties were experienced; in fact rather more, for the sledge took charge down a 'ditch,' about 25 feet deep, turning right over three times in its descent, out of which we had to drag it, and while clearing harness (which employed us both, one to stand in front of the dogs with the whip, while the other cleared the lines), the dogs made a sudden bolt past Lieut. Rawson, who was in front with the whip, and dragged me more than a hundred yards before we could stop them. But he held on to the harness all the time, and so kept the dogs. On his grip depended poor Petersen's life. At length, after the usual process with Petersen (that of thawing his hands and nose, which we did every time we cleared harness, or it was actually necessary to stop), we got away, thankful that our troubles were over. The dogs got their harness into a dreadful entanglement in their excitement to get home, but we were afraid to clear them lest they should break away from us, or cause us any delay, as we were both naturally anxious to return with the utmost speed to the ship, and so relieve ourselves of the serious responsibility occasioned by the very precarious state in which our patient was lying. Upon arriving alongside the ship at 6.30 P.M., we were very thankful that Petersen was able to answer us when we informed him he was at home."

On the 20th of March, Egerton and Rawson again started on their perilous errand, this time accompanied by two smart seamen, John Simmons and Michael O'Regan. They made 15 miles the first day, and were established in their tent by six o'clock, lighting their pipes, and, "of course, we tied up the ventilating holes, as we had no intention of letting any warmth inside escape into the cold air without." Next day, "the travelling became worse. We were keeping to the land, and the whole of the drift between the slope of the cliff and the hummocks was at a considerable angle, sometimes very steep, up and down always. The latter we did not object to, though the sledge capsized frequently, but the former gave us no end of trouble, and unless there had been four of us our progress would have been very slow, for the dogs are of little or no use in this kind of travelling, but what use they were we got out of them by constant application of the whip. Even that is no use unless one man walks ahead to lead them, while the other three, having cut a footing with a pickaxe, sit down and 'one,' 'two,' 'three,' 'haul,' until the sledge is up, when the dogs, finding the strain eased, start off at full swing down the hill on the other side. The sledge slides down a short way sideways and then capsizes, sometimes turning clean over three or four times. This style of thing went on incessantly until we became rather more knowing,

and found it better for one to walk down the hill very slowly in front of the dogs with the whip in his hand. By so doing we sometimes avoided the usual capsize, being able to ease the sledge down gradually. At last we came to the conclusion that, although the pack beneath us was nothing but what is commonly called 'rubble,' being pieces of floes, somewhat rounded in shape from constant turning over and rubbing together, much resembling boulders or large pebbles in form, with small pieces between them, all cemented together by freezing, it could not be much worse than what we were then having, and determined to try it. To get the sledge down from our position, which was about 20 feet above the pack, was the first thing. To do this we untoggled the dogs, secured the drag-ropes to the back of the sledge, the tent guys as well, and then, all having got as firm a footing as possible, we lowered the sledge over. Unfortunately our backing ropes were not long enough, but there was nothing for it but to let go, trusting to Providence for the rest. The sledge, being uncommonly strong, stood the blow it received at the bottom splendidly; to get the dogs down was a very simple matter,—by the aid of a whip they soon found a way down for themselves, bustling down one on the top of the other.

"After getting the sledge over a short distance of this 'boulder' ice, we came to a lane of perfectly smooth ice running along just underneath the perfect wall of ice formed by the grounded hummocks and floe-bergs, the outer sides of which were cut as straight and polished as smooth as a piece of marble, with parallel lines cut out by the pack grinding against them when in motion. There are some enormous hummocks piled up to a height of 60 feet in places.

"The travelling over the smooth ice was excellent, but we seldom came to more than a hundred yards or so of it without hummocks intervening, which generally had to be cleared away with pickaxes. As we got further on, we found water on the top of this lane of ice, which appeared to be continuous; and the pack being too hummocky to attempt, we were compelled to take to the land again just opposite the third ravine from the cairn on Cape Union. Half a mile further on the slopes became too much for us, so we took the floe once more, preferring the 'one,' 'two,' 'three,' 'haul!' and getting something, to the same with no result.

"We took to the land again off a very large ravine trending to the northward: here the cliffs do not come down to the water-line at such a steep incline, leaving a good road between land and grounded floe-bergs. As the land trends away to the westward to form the bay, the hummocks become less in size and number.

"When we came to any good travelling, Lieut. Rawson and I walked on ahead, the dogs keeping close to our heels, while the men took it in turns to sit on the sledge and to steer. At 6.15 we reached the depôt and encamped beneath it, all pretty tired, including the dogs."

On the morning of the 22nd, "called cook at 6.30 A.M. Under weigh by 10.30 A.M. Across the bay the travelling was very fair, the line of Sastrugi running exactly in our course. Here we had a slight misfortune,—the toe of the sledge-runner caught under a ridge and sprung. As we approached Cape Frederick VII., getting under the land, the travelling became more hummocky, and the snow was just hard enough *not* to bear. Now, if there is one thing which takes it out of one more than another, it is that you tread upon a piece of snow which looks nice and hard, and as soon as your weight comes fairly on it—not just when you lift your other foot, but several moments later—down you go, sometimes up to the thigh, your teeth clatter, and you run a very good chance of breaking a leg, or being hit in the face with the knee of your other leg.

"Off the point it was far too hummocky to hold out any hopes of getting round on the ice; so we took to the land, and found it much the same as the bad part yesterday, up and down hill, hauling and capsizing continually. Once, when the sledge capsized, the backs caught against a hummock and both carried away, causing a short delay.

"At 1.40 we stopped for luncheon, and fished the sledge backs with the two spare battens. At 2.30 we started again, travelling still very bad; and at 5.45 pitched the tent, just to the northward of a ravine. Rawson sprained his wrist, so I put on a bandage. Simmons's wrist has been rather sore where it was frost-bitten some time ago, so I applied cotton wool and a bandage. The upper parts of our sleeping bags, where they are covered with canvas, were frozen so stiff that we found some difficulty in getting into them.

"We all suffered considerably from cramps in the legs during the night, more so than usual. Under both knees and up to the thighs are generally the worst places. I was cook, so got under weigh with the cocoa at 6 A.M. Turning out in the morning and rigging for the day is the worst part of the 24 hours. The first thing is to see that all foot gear is ready, and that a blanket wrapper is not under somebody else's bag: having prepared boot hose and wrappers so as to slip on as quickly as possible, off comes the warm night gear, one foot at a time, and the first thing to put on is a flannel wrapper 16 inches square, which has been drying next the skin all night; then comes the boot hose, the sole of which is perfectly hard and a good deal of frozen snow sticking to it, which sends the first chill through one's foot; next comes a blanket wrapper, which is so hard that, when tapped, it sounds like a piece of wood; this has to be put on the same as it was taken off, for the shape of the foot is so clearly stamped on it that the corners would not double over if put on any other way: as it is, the corners are tolerably hard, and one generally finds a hard place next to the big toe; lastly, put on the mocassin and kicking straps, by which time all the blood in one's body has gone into the head, the fingers are cold, and the kettle has to be supplied afresh with snow. When that is all right, the same misery as before has to be gone through with the other foot, and by the time the cook's bag is rolled up and got out of the way the water is boiling, in goes the chocolate and sugar, and then comes the brushing down. The cook puts on his canvas jumper, walks on the bodies of the sleepers in the most promiscuous manner, and having covered up all the crevices with the coverlet, brushes down the condensation, removes the coverlet outside the tent on to the sledge, and then rouses out the others, who sit up in

their bags while the cook serves out the cocoa, he having first provided a spoon for each and placed the biscuit in the centre of the tent. When all are served, he puts on the stewpan full of snow to get ready for the pemmican. As soon as the cocoa is finished, and the 'blue' served out ('blue' is the name given to what is left when all have been served), all hands set to work to rig for the day, the cook keeping himself warm outside the tent the best way he can until the pemmican is ready, by which time all are rigged and the bags rolled up. When the pemmican has been discussed, if time admits, a few minutes are given for a smoke; then prayers are read, and all begin to pack the sledge, strike the tent, and clear the dogs' harness, except the cook, who cleans up the pannikins, ready for the next meal.

"The way we divided our daily rations was to have for breakfast, cocoa and biscuit, and half the allowance of pemmican; for luncheon, cold bacon, tea, and biscuit; and for dinner, tea and pemmican, and a glass of grog the last thing.

"By 10 o'clock we were under weigh. For the first 1½ mile we stuck to the land, travelling on the slope inside the hummocks; but this becoming steeper, we tried the floes again. The travelling was very rough, and we had continually to assist the dogs and sledge over the hummocks, but occasionally we got a smooth piece without any water. We came to a bay about 3 miles wide and 2 deep, which I called O'Regan Bay. The point at the southern extremity of this bay gave us no end of trouble to round; we tried the land, but found it perfectly impassable, even on foot; the cliffs are very steep, coming down to the water level at an angle of, I should say, 35°; the hummocks are shoved well up on the land, showing that considerable pressure has taken place here. We lowered the sledge on to the floe, a height of 25 feet, having cleared away with pickaxes. There being too much water on the crack, which still continues outside the hummocks, we struck out more from the land, and came to one or two very good floes, and, by mounting hummocks continually, were able to pick a very fair road.

"At 6.45 we encamped on the floe. Each night we picketed the dogs, and found it acted very well, none of them breaking adrift except 'Flo,' who managed to get out of her harness, and any other lashings we put round her, every night, but she always lay down quietly and gave us no trouble. Though the temperature was not very low, we all felt very cold, and could not get warm, do what we would; the tips of my fingers, which were frost-bitten during my last trip, from clearing harness, have become blistered, and are rather uncomfortable. We came to the conclusion that we were just beginning to find out why they lined Southsea Beach for us when we left England, though they did not know why themselves. All our mocassins, which were soled with the tops of fishermen's boots before we left the ship, have holes in them, the snow gets in and cakes, forming a pad about ¼-inch in thickness; this we found made our feet sore, so cut the soles off.

"On the 24th, after rounding numerous small points, which shut out the ship from view, we at length sighted the 'Discovery,' and gave three cheers as loud as ever we could. Our party were all in very high spirits at the thoughts of seeing our friends on board, and the prospect of a comfortable night instead of the usual cold and cramps. We were about half-a-mile from the ship when we cheered, and we could see one or two figures alongside the ship stop and look in our direction; we gave another cheer, and presently we saw all hands running out to meet us, and shortly afterwards there was shaking of hands and answering questions by the hundred. When we could get a word in we were very glad to hear that they were all well, and had spent a very pleasant winter. At 5 o'clock we were on board."

After delivering the orders, and staying on board for a few days, the same party set out again for the 'Alert' on the 30th of March; and on the 2nd of April the thermometer was — 42.

"By keeping well out (about 2½ miles) from the land, we got on very well for the first two hours, but after that we came to a regular jam. There were no more floes in sight, and our only course was to make for the land. Between us and the shore there was nothing but hummocks, so we knew we had our work cut out to get there. After an hour or so at it we picked up one or two wrinkles. Instead of cutting a broad path for the sledge we simply made a way for one runner, and then canted the sledge up, one hand preventing it from capsizing; also, instead of getting into a gap not wide enough for the sledge, it was saving time to let the dogs go *through*, and (if the hummocks on either side were not more than 6 feet high) the sledge *over* the rounded tops of the hummocks. By one of us walking ahead to lead the dogs and pick the way, two walking, one on either side, in front of the sledge to guide it, and give it a heave over to right or left as required, and to clear the lines, which frequently catch in pieces of ice (sometimes dragging the wretched dog's head almost under the sledge-runners), and the fourth man steering at the back of the sledge, we got on at a very fair pace, and reached the land at the north point of O'Regan Bay at five minutes past twelve, where we had luncheon. At 1.30 we started again, and travelled on the crack underneath the ice-wall, until we came to a slight jam, when, seeing a very nice-looking floe not more than a couple of hundred yards off, we unfortunately were tempted to try it, and found very good hard snow; but it led us gradually away from the land, and by the time we had got to the end of it we found we were a mile from the shore hummocks, with large hummocks between. Having picked out the best route, we set to work with pickaxes to make a way for the sledge, but it was not until 5.30 that we got to the land again. We travelled on the slope between the land and grounded bergs to about a mile from Cape Frederick VII., where we camped, with the temperature at — 40, and inside the tent at — 27.

"Next day (April 3rd) we knew what to expect in the way of travelling, so were not disappointed at having an hour's work to get round Cape Frederick VII. At this point there is one of the most difficult places to pass on the journey. First we had to haul the sledge up on the top of a hummock, which was about 25 feet above the floe. Down the slope on the floe side was very deep snow; so we let the dogs struggle down, and then let the sledge go after them; but it buried itself half-way, and we had to dig away the snow, and haul it out again. This occurred a

second time. At the bottom there were a lot of small hummocks with deep cracks between them, covered over with snow, which we found very troublesome, the cracks being wide enough to let one in up to the waist. The travelling across the bay was much the same as we had before; and we reached the land at the northern side of Lincoln Bay, about a mile to the eastward of the depôt, at 12.20, when we stopped for luncheon. At 1.20 we started off again, and had a very good road as far as the ravine, where we took to the ice, and kept on the crack as much as possible, but occasionally were obliged to leave it, as it was too narrow to pass. These places were generally caused by pieces of very heavy floes having grounded outside the regular line of hummocks, and, having relieved the latter of the pressure, became piled up with the *débris* of the pack as it crushed up against it. At 7 P.M. we had arrived abreast of Arthur's Seat, and found great difficulty in getting the sledge over the hummocks on to the land. The lowest and best place we could find for the purpose was a straight wall of ice 10 feet high, which was so steep that we had to cut a footing in it to climb up at all. Then we cut away at the edge, and placed boulders underneath, slipped the dogs, and hauled the sledge over. Here Lieut. Rawson very nearly came to grief: trying to hold on to the dogs, they bolted with him down the other side of the hummocks, dragging him behind them head foremost."

They reached the 'Alert' on April 4th, and thus completed the perilous and difficult duty which had been entrusted to them. It must be remembered that the month of March in 82° N., as regards the intensity of mean cold, is the same as February in 75° N.; and, on the whole, the journey of Egerton and Rawson is unsurpassed in the annals of Arctic travelling. Equal cold was experienced by Mr. Kennedy and Lieutenant Bellot in February 1852, by Commander Richards and Lieutenant Herbert in February 1854, by Nares and Hamilton in March 1854, by McClintock and Allen Young in February 1859, by Payer in March 1874, and by the whole main body of sledge travellers from the 'Alert' in April 1876. But if to the sufferings from the intense cold are added the peculiar difficulties encountered by Egerton and Rawson, and that terrible night with poor Petersen, the story is one which stands alone.

It is no unimportant result of the Arctic Expedition that we should have incidents such as these to record, and to hand down to our children. Highly as we prize the geographical and other discoveries, yet, as precious results of the Expedition, all Englishmen will set an equal value on the fine qualities it brought out, and on incidents such as that of two officers keeping the circulation in the body of a stricken companion at the imminent risk of their own lives.

A few days after their return, the same two officers were selected to perform the duty of pioneering a way across the ice of Robeson Channel to the coast of Greenland, for the extended parties under Beaumont. Rawson commanded H.M. sledge 'Arrowe,' a ladder sledge 16½ feet long, with four men; while Egerton again had the 'Clements Markham' dog sledge and seven dogs. They were absent from the 10th to the 18th of April, when the cold was not so intense as on the previous journey. On the morning of the 11th Egerton observes:—"At 5.55 I was roused out for cocoa, having had the best night's rest I have experienced yet out sledging. It just makes all the difference travelling at a temperature of — 40 or — 10. In the former case it is absolute misery, in the latter, bearable; in neither comfort." There was one remarkably large floe across the entrance of Robeson Channel, which made this journey comparatively easy, and others of considerable size, all bordered by lines of hummocks from 10 to 30 feet high. The large floes were from 3 to 10 feet above the young ice, showing the enormous thickness of the Palæocrystic floes. On the 15th they landed on the shore of Greenland, the fringe of hummocks being 150 yards broad, and some of them 60 feet high. Here they established a depôt, and commenced their return journey on the next day. In mid-channel the wind was strong, and it was intensely cold, the thermometer down to — 39. On the large floes, with no hummocks for shelter, they were exposed to the full force of this wind. "We found blinkers very useful. Lieutenant Rawson, having lost his, used his prayer-book as a substitute, which he found to answer very well. We all felt intensely cold on our left sides (the weather side). My arm, which was bent steering the sledge, became so numbed that I could not straighten it." They got back to the ship in the evening of April 18th, after having efficiently performed the service on which they were employed.

The next auxiliary work was entrusted to Lieutenant May, who had suffered amputation during the winter, owing to the severe frost-bites received in the autumn travelling. He had been confined to his bed for 120 days. Nevertheless, he was ready for all the work he could get as soon as the sledging season began, and was almost constantly employed on some useful duty or other. From the 24th to the 30th of April he took command of H.M. sledge 'Clements Markham,' and went away, accompanied by Captain Feilden, R.A., the Naturalist; Mr. Wootton, the Senior Engineer; the Eskimo Frederick, and seven dogs. His orders were to explore some of the ravines, and, if possible, to find a good route from Lincoln Bay to the ship. It was considered that the neighbourhood of Lincoln Bay would be a good point whence to watch the movements of the ice in Robeson Channel; and a direct road to it would, therefore, be useful both for this purpose and also for shooting parties. May found the same difficulty as Egerton in skirting the slope at the foot of the precipitous cliffs. In some places they cut a channel for one runner of the sledge to travel along, while the four men held up the other; but there was the risk of the sledge falling on to the floe, from a height of 20 feet. On the 26th and 27th, May and Feilden were away exploring ravines for twelve hours each day, and ascertained that a passage might be found to Lincoln Bay by following the coast as far as Cape Union, and then going overland to a ridge leading to the large ravine at the head of that bay. They returned to the ship on the 30th of April.

From the 2nd to the 9th of May, Lieutenant Egerton went, in command of the sledge 'Alert' and seven men, across Robeson Channel, to leave another depôt. The men and sledge were to go on to Polaris Bay with Dr. Coppinger, who met them on the 7th, on the Greenland coast, on his way back from Beaumont's

extended party.* Egerton returned with Lieutenant May, who had followed him across the channel with H.M. sledge 'Clements Markham,' and had ascended Mount Meyer, on the Greenland coast. On this occasion they were able to make sail on the sledge, and went over the large floe at a rattling pace, with great success. But Egerton was not quite so successful in his first attempt as a photographer. "Among other things taken over by H.M. sledge 'Alert' to Greenland was a photographic apparatus, which I took with the intention of getting some photographs, and of bringing them back to the ship. Never having taken a photograph in my life before, and having only had five minutes' instruction in the art, I was rather anxious to see how the result would turn out, so I persuaded May and the crew to stand while I took a photo of the camp, dogs, and crew. I was some time getting ready, focussing, &c., and got very cold. When all was ready I took the cap off, out watch, and took the time—two minutes—May getting impatient —three minutes—I burst into a fit of laughter, as I suddenly remembered I had not drawn the slide off the plate. May was furious. After a great deal of persuasion I got them to stand again, and this time everything went off satisfactorily, except that I could not find the cap to put over the lens for some few moments."

Having amused himself as an artist, and nearly frozen his sitters, Egerton sketched the headlands, while May took a round of angles. Lieutenant May tells us the sequel of the morning's work. "We were called back to the tent, when I was surprised to find that the 'Alert's' cook was doing our cooking. Mr. Egerton joined me in my tent, and then I found why the 'Alert's' cook had been so kind as to do our dirty work; for, having given us our tea and pemmican, he helped Mr. Egerton and himself, who made a very good meal, although they had not finished their own more than an hour." This is an interesting fact, and shows how very conducive Arctic travelling is to a good appetite.

The duties of placing depôts for the extended parties having been satisfactorily completed, expeditions were set on foot with a view to enabling the naturalist to take observations and make collections, and also to survey, and secure valuable results in various branches of science within a radius of 20 miles from the ship. On the 11th of May, H.M. sledge 'Clements Markham,' under the command of Lieutenant Egerton, went away with fourteen days' provisions and six dogs, accompanied by Captain Feilden, the Naturalist; Mr. Thomas Mitchell, the Assistant-Paymaster, and a good artist; James Self, a seaman; and Frederick, the Eskimo. Mr. Wootton, in command of H.M. sledge 'Sultan' (a ladder sledge) left the ship on the same day, to lay out a depôt of a week's provisions for the northern party, returning on the 20th. These parties took with them abundant supplies of lime-juice, sufficient for daily rations, yet there were two cases of scurvy. Here is an absolute proof of the absurdity of the theory that the absence of daily rations of lime-juice on the sledges which started early in April, when it could not be used, was the cause of the outbreak of scurvy. The explorers did much excellent work, examining ravines inland, ascending peaks, and making collections in geology and natural history. On the 15th they came to a ravine, about 500 yards long, and not more than 80 broad, with cliffs on either side, which formed a sort of natural gateway into a grand valley, bounded by hills, to which they gave the name of "Westward Ho! Valley." It was a mile across, and extended for a great distance in a westerly direction. From this valley excursions were made, and on May 17th Egerton and Feilden climbed to the summit of a hill 1825 feet above the sea, whence they looked down on James Ross Bay, to the westward of Cape Joseph Henry. On the 19th Egerton got a round of angles from another hill 2000 feet high; and during the trip some remarkable mud beds were observed in another valley, of great thickness, showing sections of 100 to 150 feet, containing shells similar to those now living in the neighbouring sea. Captain Feilden, when they returned to the ship on May 24th, brought back a large collection of specimens, representing the rock formations of that portion of the newly discovered region.

From the 25th of May to the 7th of June, Captain Nares went away on a surveying excursion, accompanied by Captain Feilden, James Self, John Hollins, a marine, and his servant, Spiro Capato, with H.M. sledge 'Clements Markham,' and seven dogs, under the command of Lieutenant May. This was Captain Feilden's third sledging journey, making altogether forty days of indefatigable work in collecting and observing the physical features of the country. Captain Nares went up Mount Julia, on the Feilden Peninsula, a height of 2050 feet.

From May 27th to June 3rd Lieutenant Egerton, accompanied by Dr. Moss, William Malley, and George Hodges, went away in command of H.M. sledge 'Nellie,' to obtain soundings with serial temperatures in Robeson Channel; and also to place a depôt of 50 complete rations at Cape Union, half way between the ship and Lincoln Bay, where a large depôt had been established in case of accidents. Egerton selected a place for the soundings three quarters of a mile N.W. by N. of Black Cape, where he proceeded to dig a hole through the ice—a laborious and miserably cold piece of work. The thickness of the ice was 4 feet 1¼ inch, and the depth of water 32 fathoms. Serial temperatures at five different depths were then taken. Having done this work, Egerton returned to the tent, and found that Dr. Moss had shot a hare. Their game laws permitted the sportsman to have the head, liver, and heart of any game he shot as his perquisite, the remainder going to the sick or the general use of the ship. So that evening they had "*pemmican a la lièvre perquisite*," which was a great improvement on pemmican by itself.

Lieutenant May's two journeys for the succour of the northern and western divisions have already been noticed in our former article.* On June 8th, immediately on the arrival of Lieutenant Parr at the ship, he set out, in all possible haste, with Dr. Moss and James Self, and H.M. sledge 'Clements Markham,' and six dogs, laden with medical comforts, for the relief of Commander Markham's party. On the first day he went over 25 miles in 9½ hours, and on the second

* See our number for December 1876, p. 321.

* See *Geographical Magazine* for December 1876, p. 320.

he joined Commander Markham and saved the lives of some of the men by his timely aid, having done the whole distance of 36 miles in 23 hours. He returned to the ship on June 14th with the gallant but sorely stricken explorers of the northern division. On the 18th, May again set out, accompanied by James Self, William Malley, and George Thornback, with H.M. sledge 'Clements Markham,' laden with medical comforts for the returning western division, and six dogs. On the first night, he made 22 miles in 9 hours; on the next, 18 miles, joining Lieutenant Aldrich on the 20th of June, and returning with him to the ship on the 28th.

During the month of July, Commander Markham and Lieutenant May were away on a shooting excursion for a fortnight; and Captain Feilden, with Lieutenant Parr, was also absent for a week, while Lieutenant Egerton took a party of eleven men, from the 15th to the 23rd of July, to bring back the boats which had been laid out during the autumn. This completed the work of the auxiliary sledge parties of the 'Alert'; and we propose in our next number to give an account of similar work done by the officers and men of the 'Discovery,' including the examination of the Petermann Fjord glacier, and other important services, all forming harmonious parts of the great scheme for securing the success of the Expedition. Rawson had had 92, Egerton and May 70, and Feilden 50 days of travelling, including the autumn. Rawson was away from the ships and under canvas for 139 days. In fact, officers and men were pretty well on the move during the whole season, either laying out depôts for and succouring the extended parties, or else promoting the acquisition of valuable scientific results for the Expedition.

(To be continued.)

REPORT OF THE SCURVY COMMITTEE.

THE Report of the Scurvy Committee* has at last been presented to Parliament. The long delay was caused, not, as has been alleged by certain unscrupulous newspapers, because the Lords of the Admiralty felt any reluctance in publishing it, but because a "Paper on Scurvy," which the two medical members of the Committee were requested to draw up, was not submitted until the 7th of May. The Report is accompanied by the evidence of fifty witnesses. Ten have never been in the Arctic regons, twenty are old Arctics, and twenty were members of the late Expedition.

The weight of the Arctic evidence fully bears out the view we have already expressed in former numbers;† but we are surprised to find that the Report of the Committee is not in accordance with that evidence.

The Committee had to report on the causes of the outbreak of scurvy; on the adequacy of the provision made by the Admiralty in the way of food and medicine; and on the propriety of the orders given by Captain Nares for provisioning the sledge parties. Their conclusions are that the outbreak was due to the absence of lime-juice from the sledge dietaries, though they think that the long winter also had an effect on the health of the men; that the provision made in the way of food and medicine was *more* complete than that made for any previous expedition; and that the orders of Captain Nares for provisioning the sledge parties were not proper, because they deviated from a suggestion (which he was not ordered to follow, but which was simply furnished for his information) made by Dr. Sir A. Armstrong, the Medical Director General.

The first conclusion is evidently based on preconceived notions, and is in direct opposition to the weight of the evidence, and especially of the Arctic evidence. The highest living authority on sledge travelling is Sir Leopold McClintock, and his evidence is distinct that the seeds of scurvy were sown before starting from the ships, and that the issue of lime-juice on the sledge journeys would not have kept it off (3324).* Admiral Richards, Admiral Ommanney, Admiral Pullen, Captain R. V. Hamilton, and Captain Allen Young either gave similar evidence or attributed the outbreak to the exceptionally long winter. Turning to the medical evidence, Fleet-Surgeon Scott, the experienced medical officer of the 'Intrepid' in 1852-54, said that the scurvy would have broken out on the sledging journeys if lime-juice had been taken (3954), and that the outbreak was to be attributed to the effects of the long winter (3948). Dr. Lyall, the former surgeon of the 'Assistance,' in 1852-54, gave evidence that though lime-juice was useful as an anti-scorbutic, it will not prevent scurvy altogether (4306), and that the long absence of light was an important element in the outbreak (4438). Dr. Ede, the Assistant-Surgeon of the 'Assistance' in 1850-51, concurred with Dr. Lyall as regards the long absence of light, and Dr. Piers, formerly of the 'Investigator,' also bore witness that daily allowances of lime-juice during the sledging would not have averted the outbreak, because the scurvy was latent, in some form, before the men left the ship (4688).

The facts of the case fully bear out the opinions of these eminent Arctic authorities. During the autumn travelling, when the work was quite as severe, there was no sign of scurvy, while it made its appearance almost immediately after the parties started in the spring. The only difference between the two cases was that the long winter had intervened. Only the blindest prejudice could fail to see that the winter, and its attendant circumstances, injurious to health, supplied the sole explanation of immunity in the autumn and of the outbreak of scurvy in the spring. But the proofs are cumulative that lime-juice would not have prevented this outbreak. There were seven cases of men being attacked by scurvy on board, while regularly taking their daily rations of lime-juice; three of whom had never even left the ship at all (not one only, as incorrectly alleged by the Committee). In the case of two sledge parties later in the season, when daily rations of lime-juice were issued and taken regularly, there was scurvy; and in Dr. Coppinger's very able and important evidence, we again find that the outbreak of scurvy was certainly not prevented by the administration of lime-juice (2792), nor was it efficacious as a cure for scurvy. No improvement was

* See our numbers for February, 1877, p. 44, and April, 1877, p. 107.

† See our numbers for December, 1876, p. 322; January, 1877, pp. 3 and 15; April, 1877, p. 89; and May, 1877, p. 122.

* These figures refer to the numbered questions in the Blue Book.

found in men who received large allowances of lime-juice, until after they came on a diet of fresh seal meat (2974).

Why, in the face of such overwhelming evidence, the Committee should have come to a conclusion so distinctly opposed to it, we cannot conjecture; but there can be no hesitation in preferring the opinions of the highest Arctic executive and medical authorities, headed by the revered name of McClintock, and supported by all former experience, as well as by the facts of the recent Expedition, to the unsustained notions entertained by the five members of this Committee.

The second conclusion of the Committee is that the provision made in the way of food and medicines was *more* complete than that made for any previous expedition which has proceeded on Arctic service. As a proof of this assertion a list of the provisions supplied to the late Expedition is inserted. But, obviously, this proves nothing without a similar list of provisions supplied to a former expedition, with which to compare it. The fact is, that the provision was not more complete than, but identical with that for the previous expeditions sent in search of Franklin, except that in some respects the 'Alert' and 'Discovery' were not so well supplied. In the expeditions of Austin and Belcher, the means were provided of making beer. The late Expedition had no such advantage. In Kellett's expedition very good bacon was provided instead of pork. In the late Expedition there was nothing but pork, except for the sledge parties. In former expeditions the salt beef was excellent. In that of 1875-76 it was too salt, very tough, exceptionally hard, and inferior to the ordinary salt beef used in the navy (2982).

The third conclusion of the Committee it is impossible to justify. It is that the orders of Captain Nares for provisioning the extended sledge parties were not proper! The sole ground for this extraordinary assertion is, that he did not adopt a crude suggestion made by Sir A. Armstrong to the effect that frozen lime-juice, in bottles, should be taken on the sledges in April. Dr. Armstrong's suggestions were supplied for information; in short, for what they might be worth, and not for guidance. His opinion is worth no more than that of any other Arctic medical officer, certainly no more than those of Dr. Lyall, Dr. Scott, or Dr. Piers. Captain Nares, having no reason whatever, from the experience of the autumn travelling and from the state of the health of the crew during the winter, to anticipate any outbreak of scurvy, very properly followed the best former precedents, as established by the experience of previous expeditions. When Dr. Armstrong suggested a radical change in the well-known and nicely-balanced scale of diet for Arctic sledge parties, he was bound to give some reason for the contemplated change. His neglect to do this places the whole *onus* of the outbreak upon him, if his theory be correct that the scurvy was due to daily rations of lime-juice not being taken by the sledge parties. He has since suggested that the lime-juice might have been used by mixing it with the pemmican, but he ought to have made this suggestion before the Expediton sailed. He gave no reason for the change, and suggested no method of using lime-juice in an Arctic April, but merely threw out a crude hint that it should be taken. Captain Nares, in following McClintock's scale of diet, was perfectly right from the point of view of the information he then possessed. His orders were proper and judicious, and were the same as would have been given, in like circumstances, by McClintock, by Richards, by Hamilton, or by any other leading Arctic authority. The reflection cast upon him by the Committee, in asserting that his orders were not proper, is, therefore, altogether unjustifiable.

The Report of the Committee is followed by a "Paper on Scurvy," by the two medical members, Dr. Donnet, an old Arctic officer, and Dr. Fraser, a civilian; which is divided into three sections:—1. On the Views of the Profession in regard to this Disease; 2. On Exceptional Cases of Immunity deserving of further Investigation; and 3. On Suggestions for Prevention and Treatment.

They tell us that the nature of the disease, the exact abnormal conditions which are present, and even the variations from the standard of health in the performance of many important functions during its existence, are as yet unknown. This being the case, there should be no claim to special scientific knowledge respecting a subject on which total ignorance is confessed. Great diffidence in the expression of opinions as to the best means of prevention and cure is, under these circumstances, incumbent on those who discuss the subject. It also appears that the medical profession is by no means unanimous as regards the cause of scurvy. The majority in this country attribute it to a deficient supply of fresh vegetable food, although scurvy is reported to have occurred among certain of the inhabitants, in Russia, who live entirely upon a fresh vegetable diet (2829); and Dr. Monro gave evidence of several cases of scurvy among the troops in India when on full rations of fresh vegetables. Others, including Sir Robert Christison, believe that scurvy is caused by deficiency of the nitrogenous principles of food. Dr. Garrod, and his school, refer the production of the disease to the absence of potash. Dr. Black has published his reasons for referring it to the want of heat-producing food.* Dr. Aldridge assigns the greatest influence in the production of the disease to the deficiency of phosphorus, sulphur, lime, and soda. Dr. Galloway, of Dublin, puts it down to an insufficient supply of salt and potash. Dr. Stevens held that it was caused by the use of citric acid, the chief constituent of lime-juice.† The majority of the medical profession in America scorn lime-juice as a preventive of scurvy altogether.

Thus we are met, at the outset of the investigation on scurvy, with avowed ignorance as to its nature, and with a great variety of opinions as to its cause. But the evidence now collected proves that the outbreak of scurvy in the late Expedition was due to want of fresh meat, and to the great duration of the winter darkness, with its accompanying conditions injurious to health. The difference between the number of cases in the 'Alert' and 'Discovery' is one remarkable proof, among many, of this fact. There were 45 cases among those who wintered in the 'Alert,' and 15 in the 'Discovery.' Fresh meat was served out 14

* See our number for January, 1877, p. 15.

† Pereira's *Materia Medica* (4th ed.) ii., Part II., p. 538.

Map of the
SEAT OF WAR
IN
ASIA

Scale 1 : 750.000.

0 5 10 20 30 Engl. Miles

0 10 20 30 40 50 Versts.

40°

41°

40°

TREBIZOND

ERZINGAN 4580

Gumushkhane 4920

Baiburt

Ashkale

Kemakh

Keshish D.

KOZLI CHAN

TORUL

OVAJIK

Kara Su

Euphrates

Kohanam

Massat Dere

Sheyran Dagh

Kerdak D.

Merjan D.

Bazhyr D.

Makur D.

Barkhur D.

Bahteli D.

Yazikli D.

Sheytan D.

Kiretch burun

C. Ieros

Kiblik mersin

Ak Chek kala

C. Sitnun

Platana

Aya Sofia

Kaimakly

Kovala

Fatkas

Eraklı burun

Surmene

Yeli burun

Of

Marsako

Rize

Atina

Sindovia

Laros

Atienos R.

Monaure

Mariambaly

Monaure

Kaisaria

Ardesen

Shimil

Salouchar

Vakhshan

Gadmir

Giridis

Akhbanos

Koskor

Tazakhbur

Khart

Ardusta

Gorsi

Kyan

Pige

Ishbonos

Khaik

Tomra

Vanchen

Ishkildas

Kaskala

Tekkcie

Kitteva D.

Mezre

Vaserni

Ogurmish

Shabkhane

Kavas

Keshik kui

Injesu

Charak

Kolat

Staurı 7350

Madem

Zigane

Kemiji

Bor Bend

Kharuwa

Chid

Niveneo

Ardas

Kale

Kapru Bashi

Krom Dere

Kerinti

Nurshin

Kerazmashki

Vlu Sheyran

Abiyon

Jengurish

Seyrsum

Alanza

Kosse

Kelkid Chai

Tengiz

Chiftlik

Kiliji

Supursatlar

Sadagh 5730

Bandalalar

Poske

Kellur

Sipikor

Thurink

Balk

Agy

Dallanga

Khakh

Thil

Brastik

Kuritelek

Yaver

Kashunkar

Ulije

Tumagi

Apushi

Ardagi

Kosalar

Mullakoi

Surbar

Mugsi

Serans

Kalejik

Belmanayar

Dallau

Sarikaya

Kalarach

Kargin

Sarikaya D.

Kelmesi

Mughrer

Mamakhatun

Pekeriji

Mariam D.

Penik

Jinis

Chirkt

Tuzla Su

Agviran

Ellaldi

Ovajik

Abrenik

Alirik

Komnieer

Kharaba

Chanakji

Akviran

Sheikhko

Ash.

Parmaks

Bork

Almali

Hach D.

Beshkoi

Melikhan

Shorak

Khindris

Ova

Singol Su

Sharik

Kiltchibak

Chirmi

Yelim

Bilejik

Subus D.

Herdif

Khinzori

Vazine

Tertik

Kuilmajid

Rabat

Danzik

Pelmur

Eshkirik

Velandi

Seid mazar

Beliran

Mulla Ali

Khakhachur

Khopik

Khudik

Adalar

Pir Sultan

Tapus oglu

Direk

Belani

Urfat

Khudi

Goneli

Tchoroos

Agvesi

Mirza oglu

Lich

Bashkoi

Bashchaush

Uzunhach

Otlukbeli

Eimaly

Lorilar

Kiretak

Hegni

Hirdi

Plur

Shurut

Namase

Pir

Ahmed

Kirikli

Khut

Tekkcie

Kaskala

Yaver

Khandrut

Balakhor

Vanchen

Ishkildas

Kavas

Shabkhane

Ogurmish

Vaserni

Mezre

Kitteva D.

Kolat

Staurı

41°

42°

GURIA

IMERE

AJARA

BATUM

Chorok Su

Supa

Sv. Nikolaya

R. Cholok (Russian bound)

Shefkatil

Bersenal

Kvasakovo

Chulok

Ozurgeti

Askana

Tsikhisatshvani

Tikhaur

Achi

Churuk Su

Knitrish

Imara

Chekhatai, 3500

Kapuleby

Kakha

Tskhenwani

Dyduvakho

Samena

Dagun

Chakviskale

Chakvi

Karua

Kalua

Bidzhi

Gorgom

Ajara Chai

Dyduara

Chakvistavi

Makhenjauri

Buk Senerbeku

Orta Basumi

Khelvachauch

Ergo

Gunia

Tsoniarisy

Ukhe

Chuana

Khula

Nandoly

Neniya

Chkhala

Tbety

Shuakol

Chilto

Aime

Rikhet

Tilia 8200

Injared

Granchakai

Orchashen

Khuni

Kachkai

Tzkaltnil

Kegisman

Digvir

Arila

Akhaltzikhe 3376

Kvavilajvari

Kakheban

Orkisoban

Kohlian Chai

Abbastuman

Ogurets

Nagobi 8500

Khanis Tsvari

Bagrad nishan

Makralas

Abu Islam

Khopa

Ombole

Kibe

Kokabet

Kedi

Sugorety

Merisi

Mochikhet

Majkhal

Muradit

Nerlavan

Yorchga

Azago bashi

Lamnal

Melai

Omana

Sunkoty

Artvin

Yazria

Nakhalbur

Sorgi

Deliteman

Gurdishk

Del Osman

Ardanuch

Ichkalur

Okhkar

Matzalakheti

Beshanget

Kolik

Kirporom

Balkhar (Barkhal)

Balkhar D.

Ashmishen

Portakrak

Oska

Kyukh

Akurtis

Olor

Akurtis

Yersis

Lick

Yev

Khingamek

Isatuor

Kiskan

Khyk

Tortum Gol

Oshk

Ushnag

Chorgone

Otka

Azor

Oset

Khakhut

Buyuk bagh

Gedik Su

Yykyk kapysy

Adernes kapisi

Kyska

Kyskha kapisi

Makisser

Goksu

Vertek

Yark

Khashut

Nershin

Gei

Tortum

Sagir

Samsun

Akcha

Id.

Shakarli

Kutumsu

Surp Sarkis

Kutumsar

Muskhurtag

Tekkhag

Bar

Kandakhor

Kodam

Tukhki

Karagod

Kilo Zit

Kirechly D.

Kondakhor

Euphrates

Irize

Bisdingas

Akbaba

Dumly D.

Giregosak

Chipakh

Tinarken

Tiwanj

Hinsh

Tirnak

Ortu zi

Sheikhjik D

Meimansur

Karars

Mudirge

Sos

Hassanikale 5289

Baldyzy

Yenikoi

Alvar

Tanyik

Ertiv

Agzir

Yeplar 6510

Top D.

Alchyar

Topag Gol

Ilije

Gez

Pass 6396

Uzun Ahmed

Nebikoi

ERZERUM 6400

Deveboyun

Tuzji

Palandoken D.

Kargin

Khenege

Taura

Tzeginin Bashkoi

Kizil Gechid Chai

Madrag

Tatoc

Molla Mahmed

Chum

Beveran

Sogni

Chaurma

Dusyurudi

Altynly

R. Aras

Gegolan

Khalkhal D.

Manan

SHUSHER

Gumbet

Chiftlik

Gelan

Hamzan

Basdoki

Bingol D. 12300

Khnis 5840

Chaurta

Pernek

Tuzla

Penyak

Sovrek

Avdost

Teorinek

Sovkar

OLTI

Nariman

Tegda

Pagari

Arsinek

Keroglu

Zaliya

Pertes

Vartoni

Bashkoi

Vartanyk

Toprak

Chakanchaur

Chermek

Eshek Meidan

Chiplakli

Chiraleli

Bardus

Akmerze

Chama 9250

Kumby Pass

Delimusa

Chibuk

Yenikoi

Koroglu

Akrak 8850

Milledur

Sarikamysh

Kaklia

Karaurghan

Meshingerd

Surp khach 9560

Mykhatyr

Karaurgan

Zwin

Kadyk

Tashkesen

Masujik

Chermik

Kerak

N

Ardost

Asap

Zare

Khoresan

Aras (Araxes)

Karaklisa

Churuk

Dagnis

Alvar

Koprikoi

Komarol

Delibaba

Amrakcam

Ishki

Ardy

Arpik

Andak

Ajikhalil

Bashkoi

Agry D.

Kose D. 11276

Alager 9400

Aguli

Matokh

Serkez

Alashgerd (Topra 6500

Budakh

Jeligol

Kurdalu

Meidekon

Mulla Suleiman

Jambaghi

Sary

Sevik

Mardakoi

Avalkoi

Sharian D.

Golerashen

Mulla Hasein

Asavkoi

Sharian Su

Soilamas

Karayazi Steppe

Kasagas

Kazbel D.

Seid

Karajaviran

Bashrua

Koshki

Dutak

Bazirgan

Yezmer

Gonai

Karakui

Sarveli

Kara kapri

Kozli

Torlu

Murad Chai

Dutakh

Lakhbutak

Gek Su

Kerinkaya

Takh tapa

Akveran

Kits

Segni

Tortum

Olur Chai

Sushurus

Sosor

Karatuz

Taviskar

Vira

Ola

Panasker

Panshurt

Kanj D.

GOHE

Dadashin

Gokasn

Khameskar

Signot

Salit

Kourkan

Gupe

Merdenik

Kizil Yar 10000

Magrajik

Tachagerd 7700

Kurtakh

Kaznafar

Kalajukh

Digor

Gurkashen

Kur

Derkilisa

Urut

Golesu

Taraskoi

Tanar

Shadvan

Ardahan 2900

Churchury

Alagaz

Gelyali

Khevaska

Michar

Dikan

Lori

Tsurumal

Karakhopa 8970

Tsikia

Surevan

Chukta

Knirila

Vel

Sabudara

Sotid

Mamoneki

Khaun

Khertvis

ERUSHETI

CHUGURETI

Naladit

Ori

Dalija

Gulliashen

Sakhachur

Matzalakheti

Ichkalur

Del Osman

Gurdishk

Ardanuch

Khyk

Tsikhisatshvani

Kakuty

Kakutsa

8755

9343 ft

Kvasakovo

Chulok

Tikhaur

Achi

Kakutsa

Chekhatai

Tskhenwani

Dyduvakho

Knitrish

Chuduravi

Kvavilajvari

Kakheban

Orkisoban

Kohlian Chai

Abbastuman

Akhaltzikhe

Ogurets

Nagobi

Khanis Tsvari

Bagrad nishan

Tsikhisatshvani

Tikhaur

Achi

Kakutsa

Kakutsa

8755

9343 ft

Chuduravi

Kvavilajvari

Kakheban

Orkisoban

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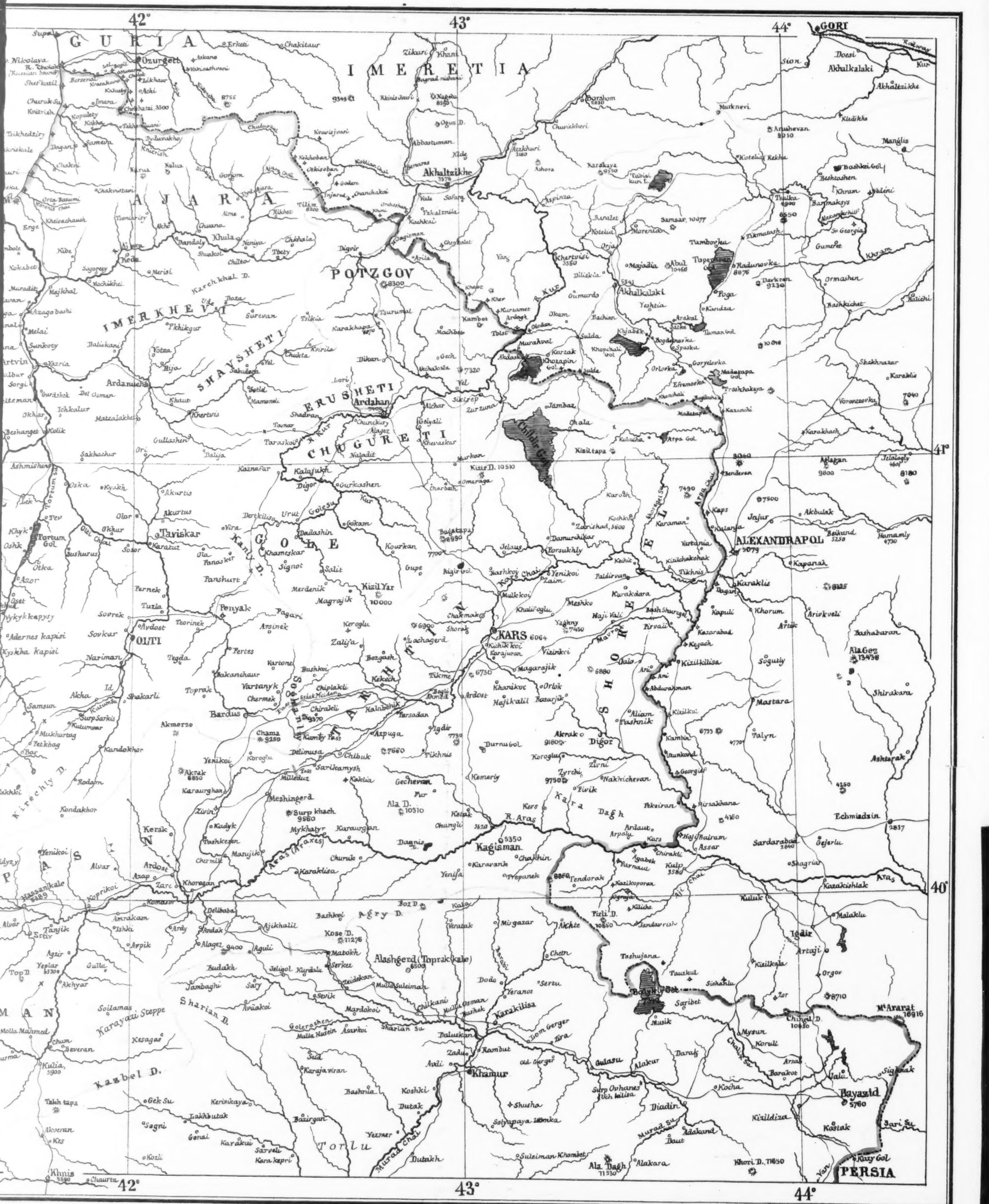
42°
43°
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GURIA
IMERETIA
AJARA
POTZGOV
IMERKHEVI
SHAVSHETI
ERUSHETI
CHUGURETI
GOLE
KARTLI
KAKHETI
SOUTH
GORI
Akhalkalaki
Akhaltzikhe
Ozurgeti
Batum
Tortum Gol
Taviskar
OLTI
Ardanuch
Ardahan
Childir G.
KARS
ALEXANDRAPOL
Kagisman
Khamur
Bayazid
Mt Ararat 16916
PERSIA
Kazbek D.
Torlu
Kirechly D.
Sharian D.
Kara Dagh
Ala Dagh
Aras (Araxes) R.
Kur R.
Akhaltzikhe 3376
Kambet
Murzavel
Akdash
Khozapin
Childir G.
Kagisman 5350
Karakilisa
Khamur
Alashgerd (Toprak kale) 6500
Kose D. 11276
Ala D. 10310
Kizil Yar 10000
Kizil tapa
Kars 6064
Alexandrapol 5079
Bayazid 5760
Mt Ararat 16916

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These suggestions may be of service hereafter, and will form one useful and practical result of this expensive and elaborate investigation. But the most important result is the information contained in the valuable printed evidence of old Arctics, and of the gallant explorers of the late Expedition, whose able and judicious remarks fully establish the propriety of the orders given by Captain Nares, and disprove the theories of the Committee.

THE SEAT OF WAR IN ASIA.

OUR map is intended to assist our readers in following the military operations now being carried on in Asia. It possesses but few claims to accuracy, for of the countries delineated only a small portion has been made known to us through the surveys of Russian officers and of other Europeans, some of them in the service of Turkey, besides which due allowance must be made for the short time allowed for its production.

The map embraces nearly the whole of the Vilayets of Erzerum and Van, which have an area of about 46,000 square miles and a population of 1,238,000 souls. The population is very much mixed. In the north we find Georgians or Lazi, who, unlike their kinsmen on the other side of the boundary, are Muhammadans. The centre is occupied by Armenians, stretching from Kars to Erzerum, whilst the south is almost exclusively occupied by Kurds. There are likewise Persians and Terekmins, or Kara Papap, who immigrated from the neighbouring Azerbeijan, and a large number of Turks. The various races may be estimated as follows:—

Turks	275,000
Persians	159,000
Terekmins	30,000
Kurds	474,000
Armenians	298,000
Jews	1,200

* See diagram facing page 330.

The term "Turks" has been used here in its elastic sense, and is made to include all sorts of people who have adopted the Muhammadan religion and Turkish manners. The Armenians were more numerous formerly; but about 165,000 of them, headed by their spiritual chief, emigrated to Russian territory. According to religion there are:—

Muhammadans	824,800
Christians	410,000
Yezidi	2,000
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Amongst the Christians there are about 288,600 Armenians, 112,000 Nestorians, 8100 Roman Catholics, and 1300 Protestants.

A glance at the numerous altitudes inserted upon our map will convey some idea of the difficulties which the country must offer to the movements of troops, more especially as there are hardly any made roads. Deep valleys, foremost amongst which is that of the Chorok, are cut into the general level of the country, and, instead of facilitating communication, they offer the greatest obstruction to it. Mountains rise to a height of 10,000 feet, and, until late in June, are covered with snow. Hardly have the roads become passable through its melting, than the enervating heat of July and August sets in. There is, indeed, but one road available for an invading force of considerable strength. It is the road which starts from the Russian frontier fortress of Alexandrapol, on the Arpachai, and passes by way of Kars and the Soghanly Dagh to Erzerum. Alexandrapol already lies at an elevation of 5079 feet above the sea. A march of 44 miles thence brings an invader to the strong fortress of Kars, not quite 1000 feet higher. Having taken Kars, or blockaded it, the invading force would proceed to scale one of the passes leading over the Soghanly Dagh, which rises to a height of 9369 feet, and remains usually covered with snow until the middle of June. There are three of these passes. That of Eshek Meidan, in the north, leads to Bardus, at present occupied by a division of the Turkish army. The Kumtu Pass, in the centre, is the easiest of the three. It leads to Yenikoi and Ardost, likewise held by the Turks. The southernmost pass, that of Melliduz, can hardly be looked upon as available for military occupations. Having reached Ardost (79 miles from Kars), the invading force enters the fertile vale of Pasin. Following the Kala Su, one of the head streams of the Araxes, the not very formidable Eve-boyun Pass has to be crossed, and the Plain of Erzerum (6398 feet) then lies spread out before him. The entire distance from Kars to Erzerum amounts to 129 miles. The most formidable natural obstacle along this road is the Soghanly Dagh, but there are artificial obstacles which are perhaps even more difficult to overcome. The chief of these is Kars.

Kars is a very different place now from what it was when so gallantly defended during the last war. The Russians, when they evacuated the town, blew up most of the forts and even portions of the principal *enceinte*, their proceedings, which were contrary to the capitulation, entailing much loss of life amongst the inhabitants who were not informed of what was going to be done. Kars was allowed to remain a ruin for more than twenty years, until the late Husein Avni Pasha ordered it to be reconstructed, and to be armed

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with guns of the heaviest calibre. The work was carried on under the supervision of Colonels Strecker, Blum, and Grünwald, German officers in the Turkish service. The fortress now forms an irregular polygon, with a double masonry *enceinte* and four bastions, wet ditches, and a capital glacis. There are numerous detached works. Fort Arkanieh is the principal of these. It is a regular pentagon on Vauban's system, and occupies the summit of the Ak Dagh, which rises to a height of 260 feet to the north-west of the town. It contains the principal stores of ammunition, and is armed with eighteen 8-inch guns, twelve 6-inch guns, and sixty-eight smooth-bore 12, 18, and 24 pounders. Kara Dagh and Top Dagh, which form a semi-circle around the town towards the east and south, and attain a height of nearly 500 feet, are defended by Ingliz Tabia and Majar Tabia, that is the English and Russian batteries. These positions have been further strengthened by a series of advanced redoubts, joined to each other by covered walks, and armed with forty-eight Krupp guns, fifty-seven smooth-bores, and eleven field batteries. The town itself forms the nucleus of these fortifications. It is defended by two heavy batteries on the wooded island in the Kars-chai, and by the Kupru-Tabia, or Tête de Pont. There are now in Kars 239 defensible casemates, 314 barrack casemates, and 275 store-casemates, and the works are armed with 289 heavy and 66 field guns. Even according to our European notions the town is now a first-rate fortress.

Erzerum, too, has been converted into a modern fortress, and its bastioned walls are said to be defended by 200 Krupp guns. Many guns, however, which were intended for the armament of that place still lie along the road from Trebizond, the available means of transport, joined to execrable roads, having proved insufficient.

By the side of the main road now described, all others are of secondary importance. The valley of the Choruk Su, the entrance to which is defended by the fortress of Batum, is narrow and difficult of access. The road from Akhaltzikhe to Ardahan has been successfully taken by a division of the Russian army, and Ardahan, in spite of its newly-erected fortifications so highly spoken of by Radde, in 1874, has capitulated; but a large body of troops, with artillery, will hardly succeed in reaching Erzerum by that route. A third road, on the south, which connects Tebriz, in Persia, with Erzerum, has likewise been seized by the Russians, who now hold Bayazid. Where this road passes from the basin of the Murad into that of the Aras, it crosses the Kosa Dagh (11,276 feet), and is said not to be passable even for two-wheeled carts.

COREA.

JAPAN having concluded a treaty of amity and commerce with Corea, there are prospects of that last of exclusive nations in the far East opening up external intercourse with other countries, China having possessed the privilege from the foundation of the kingdom in the middle of the tenth century, before which period it was a province of the empire. Not only have friendly relations been established between the Japanese and Corean Governments, but, from latest accounts, we learn that some enterprising merchants have a steamer plying monthly from Yokohama to Fusankai, carrying on a small reciprocal traffic in exports and imports, which, in time, will show what capabilities Corea may have in developing her commercial resources with the outer world. Under these circumstances, some account of the geography of that peninsula, its natural products, the condition of its people, and the character of their rulers may not be uninteresting. At the same time, the data on which our information is given, being gleaned chiefly from foreign authorities, is necessarily fragmentary, on account of the rigid exclusiveness which debarred Europeans, at the peril of their lives, from entering into the interior.

Corea, or, as it is sometimes written, Korea, has been so named by geographers from the Japanese term Kuraee, which is derived from the Chinese name Kaou-le, given by them to the peninsula, when it was divided into three petty states. Before that division took place it was designated in the flowery Chinese language Chaou-sien, signifying "Freshness of the morning," in allusion to its insular and eastern aspect to the Sea of Japan, where the vegetation on the hills and valleys is refreshed by the morning sun and moist sea-breeze. According to Du Halde, in 1122 B.C., the Emperor of China, Vŭ Vang, founder of the Chew dynasty, created Ki Tsŭ "King of Korea," who consolidated the three dependent provinces, resuming the ancient title of the kingdom, which is the one used by Coreans at the present day, but by them pronounced Tsio-sien, and by the Japanese Tsyu-zen.

This region forms one of the great peninsulas which diversify the maritime outlines of Asia and Europe, as forming one vast geographically united continent. On referring to a map of the northern hemisphere, it is not a little remarkable that we find the Peninsula of Corea in the East almost a counterpart of the Italian Peninsula in the West. It juts out from the mainland into comparatively placid waters between the Sea of Japan and the Yellow Sea, like its European prototype, which divides the Adriatic from the Tyrrhenian Sea. The eastern and western coasts of both peninsulas trend generally in a south-east direction, and, excluding the numerous islands off their shores, they are approximately of the same area, in round numbers equal to eighty thousand square miles. Moreover, their climates are similar, so that, as far as its physical aspect is concerned, Corea may be appropriately termed the *Italy of the East*, as Japan has been called "the Britain of the East."

Beyond the coast lines and harbours surveyed by foreign hydrographers very little is known of its geographical features inland; while the positions of the mountain chains, rivers, and cities laid down on our maps are chiefly derived from Chinese and Japanese sources. Yet the interior is nowhere very distant from the numerous bays, inlets, and estuaries that indent the shores of the peninsula; but the inveterate hostility of the Coreans to all intercourse with European or American representatives endeavouring to penetrate inland, renders its topography on our map almost a *terra incognita*. Besides the peninsula there are considerable groups of islands lying off the western and southern shores, collectively named the "Korean Archipelago" on our Admiralty charts, where there is abundance of good anchorage for ships of large

tonnage. The peninsula and islands comprised within the boundaries of the kingdom lie between the parallels of 33° 10′ and 42° 30′, North latitude, and the meridians of 124° 20′ and 130° East longitude. The superficies of the mainland is computed at 79,414 square geographical miles; its extreme length from north to south is upwards of 600 miles, and its greatest breadth about 300 miles.

As already observed, its topographical features resemble those of the Italian peninsula; and, although no active volcanoes are known to exist on the mainland or islands, yet geological indications of recent volcanic origin have been observed by scientific travellers visiting their shores. The highest mountain peak visible from the east coast has been measured by our hydrographers and ascertained to be 8114 feet above the level of the sea, which they named on the Admiralty chart "Mount Hien Fŭng," after a deceased Emperor of China, who was alive during the survey; besides another called "Taou Kwang," after his father, which was found to reach an elevation of 6310 feet. Those two peaks form links in a continuous mountain chain, which intersect the peninsula from north to south. This main range is not central, but trends along the east coast within an average of one-fourth the width of the peninsula, consequently the ridges or spurs trending in an easterly direction are precipitous, while those to the westward stretch through a comparatively level region.

Like Italy, Corea is bounded on the north by an Alpine chain, extending into Tartary, but of lesser elevation, the highest peaks ranging from 10,000 to 12,000 feet. Nevertheless, many of them rise above the snow line, in higher latitudes. Among the most noticeable is one named Pe-teu Shan, signifying "White-headed Mountain," its summit being covered with perpetual snow, which the Coreans assert is rarely visible, from being so frequently shrouded by clouds. According to Japanese accounts, it is reckoned to be from base to summit twenty *ri*, which is equal to fifty English statute miles. The valleys, of course, vary in length and width, according to the contour of the mountain ranges. Those on the eastern flank of the main range are short, narrow, and steep, like Highland glens, while to the westward they are long and wide, with undulating lands like English downs. Of the soil generally it is said to be fertile, but the Coreans themselves represent their country as being poor and limited for agricultural purposes. Of the indigenous vegetation, arborescent and herbaceous, all accounts agree in stating that it is luxuriant, the mountains, for the greater part, being covered with dense forests, comprising many species of trees, valuable for their timber.

The great dividing range naturally forms the watershed of the peninsula, especially where it begins to trend in a southerly direction, from the narrowed insular neck at its base. From this line southwards there are no rivers of much greater length than what flow through the valleys in our own island, those flowing eastward being similar to the mountain streams in the Scottish Highlands; and the others, disemboguing on the western and southern seaboards, are mostly navigable rivers like the Thames and Mersey. The most important of these streams is the Salayee, according to the Corean tongue, and the Han Kiang in Chinese, which almost intersects the peninsula from east to west, in its middle region, flowing past the capital of Sayool, or Séoul—the King-Ki-tau of our maps—and falls into the Yellow Sea. At a rough estimate, its course is about 150 miles. Next in importance is the Tsin Kiang—a Chinese name—which falls into the Great Canal of Corea, at Fusankai, the treaty port open to the Japanese. Besides these and others important to purely native traffic, there are three rivers of greater magnitude, bordering on the continent, and used for international navigation. Those that have been visited by Europeans are the largest of all, and partly form the boundaries between Corea, China, and Manchooria, now ceded to Russia. These are the Tu-mên Ula, and Ya-lu Ula, names derived from the Manchoo language, *ula* signifying "river." They both derive their sources from the same mountain, one of the highest in that region, named Chang-pe Shan by the Chinese, and Shan A-lin by the Tartars, or the "Ever-white Mountain." The one flows west, and the other east. They are both deep, somewhat rapid in their currents, and exceedingly sweet water. On the Japanese maps of that region the Ya-lu River is put down at 100 *ri*—equivalent to 242 English miles—for its direct course. Less is known of the Tu-mên River, but the Coreans say that it has many tributaries, forming a stream of great volume, with three mouths at its outlet into the sea. One great disadvantage pertains to the traffic by water to both these rivers, from the navigation being stopped by ice during several months in the year.

At an approximate calculation the seaboard of this insular territory, on all sides—east, south, and west—extends, probably, 1500 miles, not including the shores of the archipelago. Along this coast line the bays, estuaries, and inlets, forming good harbours and roadsteads, are as numerous as they are in Great Britain. On the west coast the navigation is dangerous where the currents of the tides are at times impetuous, and the navigation among the rocky islets, subject to a great rise and fall of tide, when a British man-of-war once anchored in deep water, and in the course of a few hours was floating in a shallow pool. On the eastern coast generally there is deep water, at all times of tide, and in some bays vessels can ride close to the cliffs rising sheer from the sea at a great depth. The dangerous navigation of the west coast, arising from strong tides and currents, has been hitherto the great safeguard of the capital from foreign invasion. At the same time, if the hydrography of the seaboard was better known, it may be found that the dangers of the Corean waters are no greater than those of the British, such as the tidal currents in Shetland, Orkney, and the Channel Islands.

The kingdom of Corea is topographically divided for governmental purposes into eight divisions, named *tau*, or *to*, each comprising well-defined provinces, circuits, and roads, the names of which we obtain from Chinese and Japanese sources, and given in three dialects, viz., Chinese, Corean-Chinese, and Sinico-Japanese. As the Corean-Chinese characters are those used in the native gazetteers, we shall give their rendering in Roman letters. These are—1. Kieng-kui *to*, which may be designated the Royal Circuit or province, as it embraces the capital; 2. Kang-on *to* is an eastern circuit, with a coast line of about 200 miles; 3. Hwang-hai *to* is a maritime circuit on the west, as its name denotes, on the Yellow Sea, with a

line following the sinuosities of the coast, some 250 miles in extent; 4. Tsiu-dsieng *to* is on the extension of this coast line to the southward for a distance of 180 miles in a direct course. 5. Dsien-la *to* extends along nearly the whole southern seaboard of the peninsula for a distance of about 200 miles, and faces the Japanese islands of Tsu-sima, with the western channel of Corea Strait between; 6. Kieng-sieng *to* embraces the south-east angle of the peninsula, and then its eastern shore trends in a northerly direction until it reaches the southern boundary of Kang-on, having a frontage to the Sea of Japan, approximating to 210 miles; 7. Pieng-an *to* is the north-west division, which has no seaboard beyond the shores at the estuary of the Ya-lu River. It forms the boundary on the frontier between Corea and the Chinese province of Shing-king, extending for 250 miles from south-west to north-east; and, lastly, Kam-kieng *to*, forming the 8th division, having a seaboard on the east coast of about 180 miles, and its northern boundary forming the frontier between Corea and that part of Manchooria which the Russian diplomatist, General Ignatieff, dexterously acquired for the Czar's dominions by cession from the Emperor of China during the war with the British and French allies in 1861. According to the Japanese Encyclopædia, these eight *tau* or *to* are divided into 41 *kün*, or counties, which include 33 *pü*, or district cities of the first rank; fifty-eight of the second rank, called *dsiü*; and 70 of the third rank, named *hien*, the same designation as in China.

Considering that the peninsula and islands have a latitudinal range of nine degrees, it may be inferred that the climate of Corea is more variable than countries of greater extent situated within the temperate zone. Moreover, these variations, under ordinary circumstances, are augmented by the insular position of the country to the south, and its proximity to the Tartarian Alps in the north, especially when it is considered that the hot, moist, south-west monsoon blows one half the year, while bitter blasts set in with the north-east monsoon, during winter and spring. In the depth of these seasons the River Tu-mên and Ya-lu are frozen over with ice so thick that horses, vehicles, and heavy baggage or merchandise cross them in perfect safety, while snow falls heavily and remains on the uplands for two or three months. In the southern provinces, however, the weather is genial, and not so oppressive in summer as on the mainland of China in the same latitudes.

According to Japanese accounts, and the meagre information given by the Coreans, it is not a fruitful land. They cultivate rice in the marsh lands and in the valleys, but it is much inferior to the qualities grown in Japan or China. In the northern districts the farmers reap but scanty crops, and the poverty-stricken appearance of their homesteads show that they are a needy class of the population. Wheat, buck-wheat, barley, and millet are among the cereals, and radishes, cabbage, beans, peas, cucumbers, and melons form a large portion of vegetable diet. Plants yielding export produce comprise the wax-plant, paper-plant, tobacco, hemp, and an excellent species of cotton-plant. But the principal and most valuable export is the root of the Ginseng-plant—*Panex quinquifolium*—which is prized so highly by the wealthy Chinese, under the impression that it prolongs natural life, that it fetches its weight in gold.

Among domestic animals there is a horse of the most diminutive stature, and oxen of gigantic breed. The former is not so large as an ordinary donkey, yet it is perfect in its equine proportions and spirited in action. The latter are shod and harnessed for agricultural purposes. Sheep are almost unknown, there being, it is said, a prohibition against rearing them. Of wild animals there is a good variety, especially in the forests of the hill country, both gentle and ferocious, that furnish sport and profit to the Corean hunters. The royal tiger and panther are so numerous that their skins form an article of commerce with foreigners, through Chinese traders. These animals are distinguished from those of the same species found in the tropics by the greater length of the hair, the Bengal tiger being far inferior in beauty of fur to that of Corea. Stags, hares, foxes, sables, and wolves are abundant. The skins of sables form a prominent article of tribute to the Emperor of China, and constitute a portion of the barter which goes on at frontier markets. The musk deer furnishes a medicine and perfume that are much prized, and form articles of trade. The birds are domestic fowls, pigeons, geese, ducks, cormorants, pheasants, falcons, herons, cranes, and storks. Venomous and non-venomous snakes are said to be common throughout the country, and alligators, thirty feet long, have been found in the rivers. Fish is abundant in the sea and fresh waters, and forms a staple article of food. Whales and seals frequent the coasts in the winter season, and are caught plentifully by the fishermen, who form a large section of the industrial population.

In a region like Corea, where almost every geological formation is represented in its amorphous and stratified rocks, metalliferous minerals of every description have been found, and other simple minerals of value in manufactures and commerce. Gold has been worked in Corea from time immemorial, and became so plentiful for want of export that it is said one of the kings who died was buried in a sarcophagus of the precious metal. Be that as it may, gold as a medium of exchange bears proportionately a much less value compared with silver, as formerly was the case in Japan. Nevertheless, silver ores are abundant, especially argentiferous galena, which is reported to be mined in one hill like a quarry. Copper and tin are not so plentiful as lead and iron. However, all these metals enter largely into Corean manufactures, both useful and ornamental, and form the staple articles of trade with the Chinese. Corean swords and daggers are much sought after by them; and the matchlocks, with breech-loading cannon, taken after engagements against French and American expeditions, prove that they are a skilful and ingenious people. Coal is evidently abundant, and the mines are worked with engineering skill, while it is used in smelting ores and for household purposes in the principal cities throughout the kingdom. Altogether there are data to infer that if Corea is poor in its agricultural products it is rich in its mineral resources.

From the geographical position of the peninsula, being contiguous to China on the west frontier, Tartary to the north, and Japan on its south-eastern shores, the Coreans naturally assimilate in their ethnological characteristics with the Mongolian

features of their neighbours. Their typical physiognomies present high cheek-bones, black eyes, the eyelids having an upward angle outwards, like those of the pure Chinese, yet with numerous exceptions; also, snub noses with small bridges; but the complexion is generally darker, and more like that of the Japanese. It is stated by European travellers that they are smaller in stature than either of these races, seldom attaining more than 5 feet 6 inches in height among the males. This, however, does not apply to the natives of the interior, and only to those seen by hostile visitors, prejudiced against the race. It would appear from other sources of information that the Coreans are a more mixed race of the Mongolian type than the Tartars, Chinese, or Japanese; and probably are descendants of people belonging to these three races who migrated to the peninsula in ancient times, dispossessing the aboriginal inhabitants of their territory, as the Japanese have done with the Aino race who once occupied their isles, only a remnant of them now existing in the Island of Yesso. This is confirmed by the ancient annals of China, as recorded by Du Halde, wherein it is stated that the country was formerly inhabited by various tribes, each having its own barbarous mode of government, and often hostile to its neighbours. Of these the most numerous and powerful were named "Han"—derived from the Chinese phrase for themselves as the "Sons of Han." This clan was divided into the Ma Han, the Pyen Han, and the Chin Han. The first-named occupied the territory of the Hwang-hai circuit, or Yellow Sea province; the second were located at Pieng An, the Pacific province; and the third on the lands of the Dsien La, or Southern province. A branch of the Ma Han also occupied the south-western division, named Tsin Dsieng, which means "Faithful and Pure;" and a portion of the Chin Han tribe had their abode in the south-eastern division of Kieng Sieng. Next in importance was the clan named "Mee," who held the central territories called King Kui, or the "Province of the Court," and Kang On, or "The Source of the River." Lastly, the north-eastern circuit of Kam Kieng, signifying "The Happy," was the ancient dominion of the Kan Kya Lee tribe, who were descended from the Foo Yoo, a people of Eastern Tartary.

Of the population in those ancient times, or even at the present day, the information extant is very meagre, and not much to be relied on. Père Regis, in Du Halde, informs us that about the middle of the seventh century of the Christian era, when the various tribes or clans were amalgamated under one sovereign authority, and divided on Chinese maps into five governmental circuits, these contained a total of 690,000 families. If we allow five persons to each family, this would give a population of 3,450,000; which, in all probability, was pretty near the mark, as the Chinese have, from time immemorial, computed the census of their provinces on a topographical basis. Since that period, according to the lowest statistical calculation, the population must have trebled, if not quadrupled, its numbers. On this head foreign geographers are very wide apart in their estimates, which vary from six to sixteen millions, but without furnishing any data on native authority for their statements. In the absence of such, if we take the area of the kingdom as approximate to the island of Great Britain, or the Italian Peninsula, each with a population of more than twenty millions, we might infer that the Corean Peninsula is as densely inhabited, if the fertile lands for the sustenance of the people were as great. But it has been shown that the interior is generally of a mountainous character, with poor soil on the limited lands for cultivation; therefore, if we allow only half the average number of inhabitants to the square mile, the population of Corea at present ranges probably between ten and twelve millions.

Limited space prevents us from entering into the history of the government and institutions since Corea became a monarchy. Suffice it to say that these are based upon the Chinese system of administration, by boards, over which a high functionary, or Minister of the King, presides. These are divided into six departments, which form the centre of all civil and military appointments; so that they promulgate, in the name of his Majesty, every political, social, and religious ordinance. The authority of the King is held to be inviolable and sacred, from the union in his own person of the secular and hierarchical sovereignty. Nevertheless, though his investiture by the Emperor of China is more nominal than real, he is bound to send substantial tribute annually to the Court of Peking. The Embassy appointed for this purpose proceeds to the Chinese capital by land, in the depth of winter, when the Yu-la River is frozen over with thick ice, across which the caravan marches, comprising two hundred tribute-bearers, with horses and vehicles, carrying numerous valuable packages of ginseng, cloths, furs, and other articles of native produce and manufacture. Those who have seen the arrival of the Embassy at Peking describe the dress and coiffure of the tribute-bearers as differing entirely from the modern fashions in China, but similar to what prevailed during the pure Chinese dynasties before the Manchoo-Tartar conquest, when these were altered. They have their hair tied up into a conical knot on the top of the head, no part of which is shaved, or has the long queue worn as a badge of subjection like the Chinese. To cover this great tuft of hair they wear a high-crowned hat, made of bamboo strips and dyed black. Their dress is a long coat, reaching to the ankles, made of silk or cotton, thickly wadded to keep out the cold. A sash round the waist holds it together, and instead of being buttoned, like those of the Chinese, their coats and vests are tied with short strings. They are extremely polite, and on entering an apartment take off their shoes.

Since the period when the kingdom was established under the auspices of a Chinese Emperor, the Corean Kings have received investiture at his hands on ascending the throne. At first this ceremony implied the dependent position of a tributary state, but in the course of time that has been gradually modified until now it has become almost an obsolete formality. Circumstances transpired recently at Peking when the Prince of Kung, President of the Tsung-li Yamen, or Foreign Office, stated to the French Ambassador that the Chinese Government disclaimed all political control over that of Corea. From this it may be inferred that it is, to all intents and purposes, an independent state, ruled by an absolute monarchy. Of course it has been subject to changes throughout its history, and the last and most important occurred at

the close of 1873, when by a dexterous *coup d'état*, an obnoxious Regent was overthrown, while the whole of his colleagues, civil and military, were swept from office. Strange to say, however, the King who ascended the throne afterwards, and still the reigning sovereign, is his own son, who became heir apparent by adoption of the Queen Dowager. Notwithstanding this curious example of Oriental laws of succession, he is *de jure* and *de facto* the legitimate King of Corea. Although not more than twenty-five years of age, he has shown himself an astute, progressive, liberal-minded sovereign, able to rule his kingdom well, with the assistance of an entirely reformed administration appointed on his accession. These comprise three Grand Counsellors, the first in rank being styled the "Admirable Counsellor," or Prime Minister; the second is called the Left, and the third the Right Counsellor. Then come six great functionaries, *ex officio* members of the Privy Council, each being at the head of an Executive Department, as already observed, based upon the system of the great Boards of Civil Office, Revenue and Territory, Rites, War, Punishments, and Public Works, as in China, the presidents being denominated *Hpanso*.

This brings us to the conclusion of our brief sketch concerning an interesting country and people, by adding a few observations regarding the Corean language. Recent investigations by M. Leon de Rosny—a French Oriental linguist—into its philology, go to prove that, unlike the Chinese language it is based upon a real alphabet, that is to say, a series of distinct vowels and consonants. It comprises thirteen of the former and fourteen of the latter. To these twenty-seven letters five others are added, which are used for the transcription of foreign names. The words or syllables formed by these letters are written and read sometimes downwards and sometimes from left to right, according to their form and the necessity of the case. The hair pencil is used in writing, as it is among the Chinese and Japanese. A great number of Chinese characters have been retained, to which the primitive significations are kept, but the pronunciation differs from any of the dialects in China. The Corean vocabulary, when compared with that of Japan, presents only a few points of resemblance, from which the question of the lineage of the two tongues can be inferred. There exists, however, a striking resemblance between certain grammatical forms of Japanese and Corean phrases and sentences, and these, though few, do not the less claim the attention of philologists, for they bear upon an important part of lexicography. The Coreans study euphony to excess, and omit or insert a letter to effect it. We may call the Corean a very expressive language; it is neither too hard nor too soft. The Chinese language is sometimes unintelligible to foreigners, because it contains a great many sounds which are only half pronounced, while the Corean is full and sonorous, and may be easily understood. As they are a very grave people, they pronounce their words with peculiar emphasis. Their language is expressive, not on account of the great number of ideas which they can convey through the medium of conversation—for, as a rule, the Coreans have rather dull imaginations—but because of its sonorous enunciation.

SAMUEL MOSSMAN.

THE INDIA-RUBBER TREES IN BRAZIL.

[IN 1876 Mr. Robert Cross was employed by the Secretary of State for India to collect plants of the india-rubber Trees of Brazil, with a view to the introduction of their cultivation into India. We have already given some account of this important enterprise, and of the successful expedition of Mr. Cross to collect the caoutchouc-yielding Castilloa trees on the Isthmus of Panama (see our numbers for Feb. 1876, p. 31, and Sept., p. 253). In the following Report Mr. Cross gives most interesting details respecting the india-rubber trees of Brazil, and the methods of treating them, and of collecting the rubber.]

On the 19th of June, 1876, I left Liverpool by the "Red Cross" steamer 'Cearense,' which, after calling at Havre and Lisbon, sailed direct for Pará, which was reached on the 15th of July. This city is situated on the southern bank of the River Amazon, which, at the point where it debouches to the sea, has a breadth of 33 miles. Pará is distant 80 miles from the ocean. The population, numbering about 40,000, are chiefly engaged with the despatch of import and export produce. Everything is very dear, and, notwithstanding the reputed fertility of the Amazon Valley, I found that nearly all the necessaries of life are imported. Thus, butter and fish come from Norway; rice and flour from the United States; while sugar, coffee, and *mandiocca* are brought from the southern ports of Brazil. Import duties are high, and so also are those on produce exported, amounting, in some things, such as rubber, to 25 per cent. of the value of the article. The houses are mostly built of mud, and roofed over with tiles. The windows are chiefly formed of wood, hinged at the top, and push out from below, whence the inmates, unseen, obtain views of the street and passers by. Throughout the course of the day many of the occupants are invariably congregated behind these window lids. The great bulk of the citizens go about more ostentatiously dressed than the people of London, the attire considered essential being fine black coat and hat, with snow-white ironed vest and trousers, and fancy French boots. Those who do not conform to this style of dress are stared at. Even at the beginning I did not agree with the fashion, and afterwards was farther removed from it, by being almost daily bedaubed over with the mud of the *gapós*. Coloured females and slaves may be seen stepping into carriages, perfectly loaded with large necklaces and glittering ornaments, and even the families of foreign residents are frequently dressed in the most excessive and extraordinary manner. The phase of slavery that exists is in so mild a form that it is at first not observed. In very many instances the slaves are allowed to hire themselves out, on condition of paying their owners a certain sum of their daily earnings. The whole system is evidently dying out more rapidly than the government laws enacted for its abolition require it to do.

Merchandise and other effects are removed from one place to another in the old primitive way, thus employing many hands, who earn high wages. Emigrant Portuguese, of whom there are about 5000, are mostly the carriers, boatmen, and shopkeepers of the place. The supply of water for the city is carted through the streets in barrels, and sold at the rate of three halfpence per *poto*. The *poto* contains twenty-

one English imperial pints. Within twelve hours after being deposited the water is found to precipitate a greenish substance, amounting to nearly one-fourth the quantity, which is not removed even if filtered through several folds of stout cloth. In the court-yards of the majority of the houses are open cess-pools, which, in such a glowing atmosphere, may assist in developing much sickness. Dysentery, yellow fever, and various other forms of a typhoid character appear to be permanent, although of late there have been no serious outbreaks, and the place is reported more healthy than formerly. Tetanus and other forms of nervous affections are of frequent occurrence, especially among the native-born population. I have no doubt that Pará is far more unhealthy than any city in India. It may not be so naturally, but, by a combination of circumstances, such I believe to be the case.

I found on arrival, after considerable enquiry, that the great field for caoutchouc collecting was the Province of Pará, and the islands which are scattered over the lower portion of the Amazon River. Chief of these is the Island of Marajó, which is about the size of Holland. A good deal of the rubber from the Rio Negro, Madeira, and other tributaries, appears to come in the form of "negrohead," or *sernamby*, while the Pará region seems to produce to a greater extent the finer kinds of smoked biscuit rubber. The preparation is attended to more carefully; besides which, the Pará tree is reported to be a different variety. Its milk leaves no very prominent stain on the hands or clothing, while the milk of some of the varieties of rubber of the Upper Amazon gives a black ink-like mark to the hands and clothes of collectors. Black rubber is stated by some to be deficient in recoil or elasticity. In order to form and establish a collection of plants, and for the purpose of making the various observations on the soil, climate, and mode of collecting and preparing the rubber, it was necessary to obtain a place to live in while so employed. Every one told me I should experience great difficulty in finding a dwelling, and this proved true. After travelling round Pará, and searching for about eight days, I succeeded in hiring a house, but at a very high rate, as the place was large and adapted for a family with attendants and slaves. However, it was secure, and offered every facility for my various requirements, which was important. My next work was to examine the district where the rubber trees grew. Mr. Henderson, who was known to Dr. Spruce, kindly introduced me to an old rubber collector, called Dom Henrique, who undertook to lead the way to the *seringal*, as the rubber locality is termed; but, after disappointing me twice, I resolved to lose no more time, and procuring from him the services of a lad as guide, I began to inspect the forest. On the 25th of July I made a preliminary journey to the region where the trees were wrought.

The land around Pará, including where the city stands, rises from the bank of the river southward, in the form of gentle undulations, indented, however, in many places by deep gulley-like natural ditches, called *gapós*, which often penetrate for many miles into the interior of this vast forest region, and are filled daily by the tide. To those navigable by canoes or sailing craft, the term *ujarape* is often applied. The intervening land between the *gapós* is frequently flat and moist, and owes its origin first to tidal deposits, and afterwards is raised higher by the decayed remains of successional rank growths of vegetation. On the elevated lands, beds of white sand, twenty feet in depth, are met with, covered with a layer of decayed vegetation. At a similar level to this we find a deposit approaching to clay, or very fine sand and mud, with here and there masses of sandstone or granite cropping out. In every direction where a view can be obtained, the country is seen to be covered by dense exuberant forest. Leaving Pará, I travelled over the high ground for several miles, until the primitive forest was reached, and then went down towards the *gapós*. Following through the wood a path used by the caoutchouc collectors, we soon came to a large tree in a state of decay, which had been tapped many times. At first sight I felt extremely puzzled and perplexed with the appearance it presented. From the ground up to a height of 10 or 12 feet, the trunk was one swollen mass of warty protuberances and knots, covered with thick scales and flakes of hard dry bark.

This singular state of growth, the result of the system of tapping, has not yet been recorded by any one, and so was to me unexpected. A few minutes of careful examination soon showed the real cause of these deformities. The collector makes use of a small axe-like implement, an inch broad. At each stroke he cuts through the bark and into the wood for fully an inch. Hundreds of these are made in the wood of each tree in the course of a few years, and cannot heal under any circumstance; but a layer of word is formed over the injured part, at the expense of the bark and general vitality of the tree. The newly formed wood is again cut into and splintered, and so the process is repeated on each successive layer until the trunk becomes merely a mass of twisted, wrinkled wood, with very thin, insipid bark. In this condition hardly any milk flows from the cuts, and although for years a few green leaves may continue to sprout from the points of the twigs, yet the tree may be considered as dead, and, in fact, finally withers away. It is, therefore, the injury done to the wood, and not overtapping, which lessens the flow of milk, and ultimately causes the death of the tree. The cuts in the wood are, of course, unnecessary, since the milk is met with only in the bark. The healing-over process which afterwards takes place is similar to that seen where a branch has been lopped from a trunk. The wood is compact and rather hard, and for this reason the tree lives on for a number of years, although cut and hacked every season; but the flow of milk becomes so lessened that many are practically abandoned for years before they die. This, and several large adjoining trees, were growing in moist, deep, heavy soil, of a fertile character, but quite out of the reach of any inundation.

On the 2nd of August I went in search of plants, and descended to the region of the *gapós*. It had rained a good deal previously, and the collector's footpaths were ankle-deep with mud. After wading several little pools we came to a deep *gapó*, into which the tide flowed. It was connected with many lesser watercourses, that formed a kind of network extending over a wide district of forest-covered country, the more elevated parts of which were raised only from three to four feet above the highest tides.

A considerable number of rubber trees grew along the margins of both the larger and smaller streams, intermixed with cacao and forest trees. Three were observed, the base of the trunks of which were flooded to a height of one foot, yet the roots seemed to run up to the brow of the bank, and no matted rootlets were observed, as is the case with the willow tree when growing on the margin of a rivulet. Most of the others occupied dry situations. Those *gapó* ditches were lined with soft, rich mud, without doubt possessing great fertility. The exhalations from such places, shrouded by a forest growth of 80 or 100 feet high, were sensibly felt, and on nearly every occasion when I visited those localities I experienced slight attacks of fever afterwards. The collectors also, during the working season, are often indisposed from the same cause. Although the forest was excessively damp, yet tapping was being carried on, as a man was seen mixing up some clay at the side of a *gapó*. A number of good plants were met with beneath the oldest trees. The seedlings did not usually grow in any place where the ground was covered by more than two or three inches of water at flood tide. However, by far the greatest number were met with on sites above the reach of the highest tides. I measured a few of the largest trees, all of which had been tapped for periods varying from five to fifteen years. Those found growing in shallow *gapó* ditches are preceded by an asterisk. The circumference of each one yard from the ground was as follows:—

	Feet.	Inches.		Feet.	Inches.
No. 1.....	6	9	No. 7.....	4	0
No. 2.....	6	10	No. 8.....	5	10
No. 3.....	4	7	No. 9.....	4	0
No. 4.....	3	0	No. 10.....	4	6
No. *5.....	5	10	No. 11.....	4	8
No. 6.....	5	3	No. *12.....	2	8

Most trees occurring within the limits of the worked districts are tapped, if possessing a diameter of 6 or 8 inches. Regularly tapped trees, as a rule, do not exceed 60 feet in height.

August 7th, I went in search of more plants, and on the 10th made another collection. About two thousand, in all, were obtained, but a number had to be rejected. I had cases previously made, so that I was able to plant the plants in them without delay. The soil consisted of decayed leaves brought from the forest. The rougher portion was charred and put in the bottoms of the cases, to serve as a sort of drainage. Then a layer, mixed with some wood ashes, was placed above, and the plants planted therein. Four cases, containing upwards of 1000 plants, were finished in this way, one being reserved for copaiba or any other sort of rubber plants I might meet with. While the plants were being established I commenced a series of experiments, in order to ascertain how the tree might be readily multiplied in a simple, rough way by any person not specially acquainted with the principles of propagation. Two separate beds, the one of brown sand, the other of decayed leaves, was formed. The terminal portion of shoots, but with a bud at the lower end, were planted in the beds in a reclining position, with only two inches of the points above the ground. Owing to the great distance between the buds, consequent on vigorous growth, many of the cuttings were a foot or more in length. At the same time a number were set deeply in an open vessel, containing only rain water. The cuttings in the sand bed were the first to grow, and soon made strong shoots and root fibres. Those in the leaf mould pushed more slowly, but developed green leaflets of great substance. The cuttings placed in the water had a small portion of tap root at the base, as the object was to determine if the roots would actually develop in water alone. Within fourteen days these plants had several roots formed, and one or two rather weak growths came up, but a few days after I had thrown into the water some burnt earth and wood ashes the increase in vigour was very apparent. After these experiences, I felt convinced that the Pará rubber tree delights in abundance of moisture and rich, fertile deposits.

Method adopted in Tapping the Trees.—When the plants were somewhat established I resolved to examine attentively the process of tapping, as practised by the caoutchouc collectors. In the investigation of this subject I travelled over a very wide extent of flat forest country, much divided by miry hollows and tidal *gapós*, which stretched along the bank of the River Guamá. Although this river is at least three times as broad as the Thames at London-bridge, it is not to be seen on any ordinary map. In the region alluded to there were hundreds of trees wrought by different collectors, each of whom had a separate piece of land to work on. When on these excursions I had to go away from my place of abode at about three o'clock in the morning, as I had some miles to travel over paths not always in good condition, and it was necessary to be as near as possible to the spot where the tapping operation was performed, because the collectors begin to work immediately at daybreak, or as soon as they can see to move about among the trees. They say the milk flows more freely and in greater quantity at early morn. I do not attach much importance to this statement, but I have recorded it. Another and more probable reason is, that as rain often falls about two or three o'clock in the afternoon the tapping must be done early, as, in the event of a shower, the milk would be spattered about and lost. The collector, first of all, at the beginning of the dry season, goes round and lays down at the base of each tree a certain number of small cups of burnt clay. At the lesser trees only three or four are put, but at the larger ones from eight to twelve are deposited. The footpaths leading from tree to tree are likewise cleared of sapling growths, and the bridges over the *gapós* formed at each place by the trunk of a tree are, where necessary, replaced. On proceeding to his work the collector takes with him a small axe for tapping, and a wicker basket containing a good sized ball of well-wrought clay. He usually has, likewise, a bag for the waste droppings of rubber, and for what may adhere to the bottoms of the cups. These promiscuous gatherings are termed *sernamby*, and form the "negrohead" of the English market. The cups, as already stated, are of burnt clay, and are sometimes round, but more frequently flat or slightly concave on one side, so as to stick easily when, with a small portion of clay, they are pressed against the trunk of the tree. The contents of fifteen cups make one English imperial pint. Arriving at a tree, the collector takes the axe in his right hand, and, striking in an upward direction as high as he can reach, makes a deep, upward-sloping cut across the trunk, which always goes through the

bark and penetrates an inch or more into the wood. The cut is an inch in breadth. Frequently a small portion of bark breaks off from the upper side, and occasionally a thin splinter of wood is also raised. Quickly stooping down he takes a cup and, pasting on a small quantity of clay on the flat side, presses it to the trunk, close beneath the cut. By this time the milk, which is of dazzling whiteness, is beginning to exude, so that, if requisite, he so smooths the clay that it may trickle directly into the cup. At a distance of four or five inches, but at the same height, another cup is luted on, and so the process is continued until a row of cups encircle the tree at a height of about six feet from the ground. Tree after tree is treated in like manner, until the tapping required for the day is finished. This work should be concluded by nine or ten o'clock in the morning, because the milk continues to exude slowly from the cuts for three hours, or perhaps longer. I may state that there is a great difference among collectors in the performance of those duties. Some take care to get good clay previously and incorporate it well, so that a very small portion is needed to lute the cups to the trunks; they also work with neatness and intelligence, and invariably collect a good quantity of milk. Others, again, do not take the trouble to prepare clay beforehand, but merely scrape up a handful when they require it at the side of a *gapó*, which is often of little consistence, so that a large quantity is required to fasten the cups. This class of collectors have often many fragments of clay or other impurities in their milk, the result of not following a proper method of working. The quantity of milk that flows from each cut varies, but if the tree is large, and has not been much tapped, the majority of the cups will be more than half full, and, occasionally, a few may be filled to the brim. But if the tree is much knarled from tapping, whether it grows in the rich sludge of the *gapó* or dry land, many of the cups will be found to contain only about a tablespoonful of milk, and sometimes hardly that. On the following morning the operation is performed in the same way, only that the cuts or gashes beneath which the cups are placed are made from 6 to 8 inches lower down the trunk than those of the previous day. Thus, each day brings the cups gradually lower, until the ground is reached. The collector then begins as high as he can reach, and descends as before, taking care, however, to make his cuts in separate places from those previously made. If the yield of milk from a tree is great, two rows of cups are put on at once, the one as high as can be reached, and the other at the surface of the ground; and, in the course of working the upper row, descending daily 6 or 8 inches, while the lower one ascends the same distance. Both rows in a few days come together. When the produce of milk diminishes in long wrought trees, two or three cups are put on various parts of the trunk where the bark is thickest. Although many of the trees of this class are large, the quantity of milk obtained is surprisingly little. This state of things is not the result of overtapping, as some have stated. Indeed, I do not believe it is possible to overtap a tree if in the operation the wood is not left bare or injured. But at every stroke the collector's axe enters the wood, and the energies of the tree are required in forming new layers to cover those numerous wounds. The best milk-yielding tree I examined had the marks of twelve rows of cups, which had already been put on this season. The rows were only 6 inches apart, and in each row there were six cups, so that the total number of wood cuts within the space of three months amounted to seventy-two. It grew close to a *gapó*, only 8 inches above high tide mark, and, being a vigorous tree, the cups were usually well filled; but with two years or so of such treatment the tree would probably be permanently injured. It has been supposed that the quality of the milk is better in the dry season than during the rains. Such is the case with some vegetable products, but as regards india-rubber there ought not, I think, to be any appreciable difference. In the rainy season the milk probably contains a greater proportion of water, but on the other hand I am of opinion that then a larger quantity of milk flows from the tree. No doubt the dry season is the most suitable for caoutchouc collecting, although wherever a plantation is formed with preparing-house convenient, tapping may certainly be always carried on when the weather is fine. It is a common report that the trees yield the greatest quantity of milk at full moon. In order to ascertain this, a number of very careful experiments would require to be made, extending over one or two years. Even if such an assertion was found to be true, it would probably make little difference, as tapping will have to be carried on when circumstances are most favourable.

There are two other methods adopted in tapping, which are chiefly confined to the Upper Amazon and tributaries. Both are exactly on the same principle, the materials used being only a little different. The loose outside bark of the tree is cleaned off to a height of about 3 feet. Beneath, a gutter, or raised border of clay, is pasted or luted to the trunk, enclosing one-half or the entire circumference. Cuts are thickly made in the bark above this, from which the milk flows down to the gutter, whence it is conveyed to fall into a calabash conveniently placed. The other mode is by winding round the trunk the stout flexible stem of a climber, and claying it round securely, so that no milk may escape between the trunk and the climber. These plans are not extensively adopted, and can only be successfully put in practice where the trees have not been previously tapped. There is always a great deal of "negrohead," the result of the distance the milk has to run, and to the large quantity of clay employed in the process.

Collection of the Milk.—Going from tree to tree at a sort of running pace, the collector empties the contents of the cups into a large calabash, which he carries in his hand. As he pours the milk out of each cup, he draws his thumb or forefinger over the bottom, to clean out some which otherwise would adhere. Indeed, a small quantity does remain, which is afterwards pulled off, and classed as *sernamby*. The cups, on being emptied, are laid in a little heap at the base of each tree, to be ready for the following morning. The trees occur at various distances, from 10 to 100 yards apart, and as I travelled over the intricate network of muddy footpaths, I continually felt perplexed and surprised that the natives have not yet seen the advantages that would be derived by forming plantations, whereby more than twice the quantity of caoutchouc might be collected in one-fourth the time, and at far less cost and labour.

Method of Preparing the Rubber.—The collectors of the region I visited resorted with their milk to a large shed, situated on the bank of the River Guamá. Here were quantities of various species of palm nuts—representing an *Attalea* and *Euterpe edulis*—stored in heaps, and several jars for the preparation of rubber. These jars were 18 inches high, and the bottoms were broken out. At the base they were 7 inches in diameter, bulging out in the middle to 12 inches, and were narrowed at the mouth to a breadth of 2 inches. Each person wrought on his own account, and so small jars were employed; but where a number of men are collecting for one master, much larger jars are in use. The milk, on being put into a large flat earthen vessel, is put down on the floor in a convenient place. Adjacent thereto the jar is set on three small stones, which raises it 1½ inch above the floor. The narrow space between the base of the jar and the floor allows the air to enter, which causes a current of smoke to ascend with remarkable regularity and force. When the fire commences to burn strongly several handfulls of nuts are put on; then some more wood and nuts, alternately. These are dropped in at the mouth of the jar until it is filled to within 4 inches of the top. Due care is taken that a sufficient proportion of wood is put in with the nuts. The mould on which the rubber is prepared resembles the paddle of a canoe; in fact, at many places on the Amazon this is the article most frequently used if there is much milk, and when the rubber is prepared in bulky masses. Occasionally the mould is slung to the roof, as the weight in handling it during the process would otherwise be very fatiguing. A little soft clay is rubbed over it, to prevent the rubber from adhering, and it is afterwards well warmed in the smoke. The operator holds the mould with one hand, while with the other he takes a small cup and pours two or three cups of milk over it. He turns it on edge for a few moments above the dish until the drops fall, then quickly places the flat side 2 inches above the jar mouth, and moves it swiftly round, as if describing the form of a cipher, with his hand, so that the current of smoke may be equally distributed. The opposite side of the mould is treated in the same way. The coating of milk on the mould, on being held over the smoke, immediately assumes a yellowish tinge, and although it appears to be firm, on being touched is yet found to be soft and juicy, like newly-curdled cheese, and sweating water profusely. When layer after layer has been repeated, and the mass is of sufficient thickness, it is laid down on a board to solidify, and in the morning is cut open along the edge on one side, and the mould taken out. Biscuit rubber when fresh is often 4 or 5 inches thick. On being hung up to dry for a few days it is sent to market. When I saw the process of smoking the rubber performed, as just described, I was considering the statements of Keller, and other travellers, who write on this subject, all of whom seem to believe that the smoke from the palm nuts possesses some peculiar or strange property, by which means the milk instantly coagulates. But on one occasion, when the collector was commencing to smoke some milk I saw him wait for a short time, during which he put his hand repeatedly to the mouth of the jar, and soon learned that he could do nothing until the smoke was hot. The dense white smoke rose abundantly, but the milk would not thicken on the mould. After a little while the jar became heated, and the operation went on quite satisfactorily. I put my hand above the mouth of the jar, but could not bear the heat scarcely a second; and although the temperature of the smoke was apparently less than boiling water, yet I judged it must have been at least 108° Fahrenheit. Therefore the rapid coagulation of the milk is simply produced by the high temperature of the smoke. I have no doubt that with a strong current of heated air, or a good pressure of steam from a pipe, a similar result would be obtained. The finely-divided particles of soot, which form a large proportion of the smoke, undoubtedly absorb a considerable amount of moisture, although at the same time they must be looked on as an impurity. I have no hesitation in giving my opinion that equally as good rubber could be prepared by putting the milk in shallow vessels, and evaporating the watery particles by the heat of boiling water.

Temperatures of the Pará Rubber District.—I now proceed to give the temperatures taken during my stay in the region of Pará. According to the natives, the rains begin in November or December, and end in June. However, during the intervening months of summer it will be seen that showers of rain are frequent. These usually occurred between two and three o'clock in the afternoon, and streamed down with a force similar to the monsoon showers in India. The days on which rain fell are preceded by an asterisk.

1876.	Morn.	Noon.	Night.	1876.	Morn.	Noon.	Night.
July *17	—	88°	81°	Sept. *1	76°	86°	83°
*18	79°	88	81	2	76	86	84
19	80	87	83	3	73	89	85
*20	79	86	79	4	84	92	83
*21	79	87	79	5	82	91	81
22	77	86	85	*6	73	90	82
*23	79	87	83	7	73	91	81
24	79	87	85	8	76	89	81
*25	79	89	83	9	76	88	83
26	79	87	84	10	75	90	77
27	80	87	84	*11	76	89	83
*28	79	88	81	12	75	89	81
*29	77	89	83	13	74	88	82
*30	81	90	84	14	75	87	81
*31	80	86	82	15	76	89	83
August 1	79	80	79	*16	75	90	81
2	77	86	83	17	74	88	84
3	78	87	85	*18	73	87	81
4	79	87	83	19	74	87	83
*5	79	89	83	20	73	89	80
*6	79	87	84	21	74	88	83
7	77	86	83	22	73	89	83
8	80	88	84	23	75	91	82
*9	80	88	83	24	76	90	84
10	79	89	84	25	75	87	83
*11	78	87	82	26	74	92	81
*12	80	86	80	27	75	92	84
*13	79	87	82	28	74	93	85
14	77	84	81	29	75	92	83
15	77	87	82	30	76	92	85
*16	77	85	81	Oct. 1	74	91	84
17	78	88	84	2	74	92	85
18	79	88	83	*3	75	91	84
*19	78	88	82	4	74	87	82
*20	78	87	81	5	76	90	84
21	79	88	83	6	75	89	.85
22	77	89	82	*7	74	88	84
23	78	89	82	*8	75	89	83
*24	77	88	82	*9	74	88	82
25	79	87	81	10	76	87	84
26	77	86	84	11	75	89	83
27	78	87	83	12	75	88	84
*28	79	85	81	*13	76	87	84
*29	76	87	82	14	74	89	83
*30	77	86	81	15	75	90	84
*31	78	87	82	16	75	90	82
				17	75	89	85

A glance at these figures will show that the region of the Pará rubber tree has a sustained high temperature, a fact which has already been remarked by Dr. Spruce, and other travellers. The lowest I recorded was 73°, but Mr. Henderson assured me he had frequently seen it down to 72°, and I have the statement of another observer, on whom I can rely, that on one occasion the thermometer fell to 65°. The place, however, where this observation was made, was fully 100 miles to the westward of Pará. In the neighbourhood rubber trees abounded.

Sites, Propagation, and Planting in India.—The sites most suitable for the planting of this tree will be found in the hottest parts of India. The flat, low-lying moist tracts, lands subject to inundation, shallow lagoons, water holes, and all descriptions of mud accumulations, miry swamps, and banks of sluggish streams and rivers, will be found best adapted. The tree will also grow perfectly in deep, humid land, fitted for cane or coffee planting. The Malay Peninsula, Burmah, the Island of Ceylon, and the southern portion of India, on to about as far north as 20° north latitude should possess many localities proper.

The temperature of rain-water varied from 74° to 75° for planting. But in no place would I recommend the formation of a plantation where the thermometer at any time falls below 60° Fahrenheit.

It seems to me that the propagation and planting may generally be combined in one operation, the object being to reduce the expense, simplify, and accelerate the work, and promote the more perfect development of the primary roots and trunk. The green-coloured terminal shoots of succulent growth, with the leaves fully matured, make the best cuttings. These should be cut off low enough so that there is a joint at the base. When it is desirable to plant in dry, firm land, a spadeful or two of soil should be turned over at each place, and the cutting planted in a sloping position. It should be covered with mould to within 3 inches of the point. That portion above ground should rest on the earth on one side, to its termination, so as not to suffer during hot sunshine. In all stages the crowns of the plants may be exposed to the rays of the sun. Plants intended for cutting stocks may be planted in open places, in the richest dark loam capable of producing a luxuriant rank crop of sugar cane. Seeds might be planted out permanently at once, also in the same way as the cuttings. These would prosper much better if, at the time of planting, a handful of wood ashes is added to the soil with each seed. Good ashes may be obtained by the burning of any description of green wood, or newly felled piece of forest. If the wood is allowed to rot before burning almost the whole of the fertilizing principle will be found to have vanished. If stored in a damp place the value of the product is diminished. For planting on inundated lands the period of high flood should be preferred. Cuttings of greater length would be required in this case, the lower ends of which should be sliced off in the form of a wedge. The workman could take a bundle of these, and wading into the water would plant, at proper distances, but perfectly upright, taking care to push each cutting down deep enough in the soft muddy bottom, so that not more than 3 or 4 inches is above the surface of the water. The same rule would be applicable when planting in sludge or soft marsh land. The crowns of the cuttings must not, if possible, be put under water, as the young growths springing therefrom might rot. Seeds will not be found very applicable for planting in watery places or deep mud deposits. Some would come up, but a good many would mould and decay. In the varied course of circumstances and conditions, slight changes and modifications in the methods of working will, no doubt, suggest themselves. I would not advocate—at least for the present—the extensive planting of this tree in fertile cane-producing lands, because in such a description of soil it would not be able to compete with the Central American rubber tree already introduced from the State of Panama, which grows rapidly to a much greater size, and yields a far larger quantity of caoutchouc. It should rather be planted in places where nothing else could be profitably cultivated, such as frequently inundated river margins, marsh land, and mud deposits. About 4000 tons of Pará rubber are exported annually.

(To be continued.)

Reviews.

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DISCOVERIES OF PRINCE HENRY THE NAVIGATOR.*

THIS is a second edition of Mr. Major's valuable life of Prince Henry the Navigator, first published in 1868. Neither our magazine nor its predecessor, *Ocean Highways*, was then in existence; and as but a very small number of copies of the first edition were printed, it is probable that it did not come into the hands of many of our readers: we propose, therefore, to treat the present edition as if it was a new work.

We join in our author's surprise that no Englishman before 1868 had undertaken to write a life of Prince Henry, whose character and pursuits were such as to be especially attractive to our countrymen, and who was himself half an Englishman. Mr. Major is fortunate in finding such a field open to him; he has shown sense and discrimination in occupying it; and he has made up for the neglect of former generations by the way in which he has compiled the life of his hero. His book, the result of much labour and research, is agreeably written, and very well got up.

Notices of the Prince are to be met with in various works on history and travel. Washington Irving, in his *Life of Columbus*, justly attributes the grand impulse of discovery to the deeply meditated effort of Henry's master-mind. Yet, beyond a general knowledge that the early voyages of discovery on the coast of Africa were prompted by a Portuguese prince, we doubt there being many who are acquainted with the life of Prince Henry, a man of whom it is not too much to say that he was not only one of the greatest men of his time, but one of the greatest any age or any country ever produced.

* *The Discoveries of Prince Henry the Navigator, and their Results.* By Richard Henry Major, F.S.A., Keeper of the Department of Maps and Charts in the British Museum, Hon. Sec. of the Royal Geographical Society. Illustrated with Portraits, Maps, &c. London (Sampson Low, Marston, Searle, and Rivington), 1877.

Prince Henry—named, doubtless, after his ancestors, the Dukes of Lancaster—was the fourth son of John I. of Portugal. This monarch was the illegitimate son of Peter, King of Portugal, and owed his crown to the same national and patriotic feeling which at a later date placed the house of Braganza on the throne. Ferdinand, the son of Peter, left one child, Beatrix, married to John I. of Castile. The Portuguese, already dreading the Castilian rule, refused to acknowledge her as their queen, and placed John, the Grand Master of the Order of Aviz, on the throne. His reign lasted forty-eight years; he was the greatest of the Sovereigns of Portugal, and he founded the dynasty of Aviz, under which that country enjoyed power and consideration beyond any it had enjoyed before, and such as it has certainly not known since the extinction of the dynasty three hundred years ago. King John married Philippa, daughter of John of Gaunt* by Blanche, heiress of the house of Lancaster. The King and Queen brought up their children with the greatest care, and the King, watchful of the bent of his son Henry's mind, took advantage of his natural taste, and had him instructed in mathematics.

In 1415, when the Prince was aged twenty-one, his father undertook the siege of Ceuta from mingled motives of religion and ambition, and to provide a field in which his sons Edward and Henry might win their spurs. The expedition was successful; Ceuta was permanently wrested from the Moors, and Prince Henry gained such military renown that he was afterwards invited to undertake the command of their respective armies by the Pope, the Emperor, and the Kings of Castile and England, both his first cousins. His ambition, however, lay in another direction, and had a loftier aim. Forsaking the delights and intrigues of courts, and the excitement and reputation of camps, whilst still little more than a youth, he fixed himself on the inhospitable promontory of Sagres, in the province of Algarve, of which he had been appointed governor. Of Sagres our author says that "it was a small peninsula, the rocky surface of which showed no sign of vegetation, except a few stunted juniper-trees, to relieve the sadness of a waste of shifting sand. Another spot so cold, so barren, or so dreary, it were difficult to find on the warm and genial soil of sunny Portugal. Landwards the north-west winds were almost unceasing, while three quarters of the horizon were occupied by the mighty and mysterious waters of the as yet unmeasured Atlantic." Here he devoted himself to the study of navigation and cartography; he continued his early pursuit of mathematics; he collected geographical information, both ancient and Arabic; he gathered round him experienced navigators from other countries; and he organised those voyages of discovery which for a period of forty-two years he continued to send out in constant succession. He adopted as his motto "Talent de bien faire," and on this maxim he acted through life. The only occasion in his career in which he can be charged with want of wisdom, is the attack on Tangier in 1437. On this occasion his brother, King Edward, a man his inferior in force of character, though virtuous and amiable, showed more foresight and prudence. The disastrous results of this expedition, the complete defeat of the Portuguese, and the capture, and long years of slavery only ended by death of the unfortunate Ferdinand, "the constant Prince," are well known. Heavily as the sufferings of his brother weighed upon Prince Henry's mind, he had the patriotism and courage to refuse to advise his release at the price of the surrender of Ceuta to the Moors.

Seldom, and only by affairs of state, was the Prince drawn from his studies at Sagres: in one more military undertaking, however, he engaged. In 1458, in company with his nephew, Alfonso V., he laid siege to Alcaçar Seguer, and displayed humanity rare in that age, especially when the objects of it were *infidels*. After the capture of Alcaçar Seguer he returned to Sagres, and there died, Nov. 13th, 1460. The reputation he left behind him was that of a man stout of heart, keen in intellect, and extraordinarily ambitious of achieving great deeds. Free alike from luxury or avarice, he was so generous that the household of no uncrowned prince formed so large and excellent a training school. All worthies of the kingdom, and still more foreigners of renown, found a welcome in his house; none left it without a proof of his generosity. His self-discipline was unsurpassed; his days, and often nights, were spent in hard work. He was constant in adversity, humble in prosperity, obedient to his Sovereign, devoted to the public interest, a devout Christian. He was universally beloved, for he did good to all and injured none.

It is impossible to contemplate his early and life-long devotion to science without admiration; and this is increased when we reflect on his constancy and perseverance in spite of small results obtained at a great expense, and in spite of much that must have seemed little better than failure. He was not permitted to see the great results of his study, thought, and labour; but all the more does it behove us to give to him the credit which is undoubtedly his due. He found navigation in its infancy: the sailors, timid and ignorant, crept along the coast; when sent out on voyages of discovery they eagerly seized any imaginary danger or ridiculous report as a reason for returning. Close as Africa is to Portugal, the Portuguese, by the beginning of the fifteenth century, do not appear to have sailed along the west coast beyond the ominously named Cape Non. For forty-two years the Prince laboured unceasingly—sent out at his own cost expedition after expedition on voyages of discovery—endeavoured by sound reasoning to remove the absurd alarms of the sailors—encouraged their commanders by rewards—suggested the great use of latitude and longitude in sailing, showed how these were to be ascertained by astronomical observations—improved the art of shipuilding. And what results did he live to see? The knowledge of the west coast of Africa extended to the Rio Grande, or Jeba, in about 12° N. latitude—the Cape de Verde Islands discovered—Madeira and the Azores re-discovered—this is the sum of the result of the Prince's labours in his lifetime. His life might then have been pronounced wasted: doubtless there were then shallow-minded persons who called it a failure. The judgment of posterity is otherwise:—"The coasts of

* The intimate connection between John of Gaunt and the Peninsula is worthy of notice. He married the illegitimate daughter of Peter the Cruel, another of whose daughters married his brother Edmund. One of John of Gaunt's daughters was Queen of Castile, and another Queen of Portugal.

Africa visited; the Cape of Good Hope rounded; the New World disclosed; the sea-way to India, the Moluccas, and China laid open; the globe circumnavigated, and Australia and New Zealand discovered; such," says Mr. Major, "were the stupendous results of a great thought and indomitable perseverance."

The Prince infused his spirit into his nephew, Alfonso V., and his great-nephews, John II. and Manuel, successively Kings of Portugal. The timid sailors gained under his teaching a knowledge of navigation that gave them courage to brave the wide expanse of the Atlantic, even in half-decked vessels. All the great discoveries made for years after were made by Portuguese, or those who had studied in Portugal. In 1486 Bartholomew Diaz, one of a family of Portuguese discoverers, first rounded the Cape. The great Vasco da Gama, the first to reach India by sea, the great object of Prince Henry's ambition, was a Portuguese. Columbus spent fourteen years in Portugal, studied much at Lisbon, and made several voyages to the coast of Guinea in the Portuguese service, and, had it not been for the perfidy of the King, Portugal, and not Spain, would have reaped the harvest of his great discovery. Magalhaens, the first to navigate the straits which bear his name, was of a noble Portuguese family, brought up in the household of Queen Leonora, wife of John II. Thus all the great discoveries made for two centuries after his time may fairly be traced to the Prince. It is certain that without him America must in time have been discovered; but how long might not that discovery have been delayed! and how different might not the history of the world have been!

We have preferred giving a general sketch of Prince Henry, and the results of his life, to following Mr. Major in his account of the various expeditions sent out by him. For these we refer our readers to Mr. Major's book, and promise them both pleasure and profit from its perusal.

AFRICAN EXPLORERS.*

AN important article on "African Explorers" has been contributed to the *North American Review* for May-June, 1877, by Mr. Laurence Oliphant. A chief object of Mr. Oliphant is to show that, as regards African discovery, the blue ribbon was carried off by the late Captain Speke, and to call attention to the work accomplished by that successful and intrepid explorer. It was certainly time that the general reader should be reminded of the exact nature and extent of Speke's discoveries; for the acceptance of Mr. Stanley's pretension to having discovered a new Nile source, which he has called the "Alexandra Nile," would indicate that Speke's work was not borne in mind, and was to some extent forgotten.

Mr. Stanley claims to have discovered a lake which he has named the "Alexandra Nyanza," and a river which he calls the "Alexandra Nile." Mr. Oliphant reminds us that both lake and river were discovered by Captain Speke. The river is the Kitangule (or Kageera). Its size and importance were fully appreciated by that officer, but, after carefully weighing the importance of the Kageera as a Nile feeder, he very properly did not call it the Nile; because, when a large river issues from a mighty lake into which flow hundreds of affluents, he judged correctly that the river which left the lake was not the same river as any one, even the largest, of those affluents.

Mr. Oliphant then observes that "if the Kageera is to be called the Nile, the discoverer of it, in that capacity, is indisputably Captain Speke, and not Mr. Stanley, who has changed its name into Alexandra Nile; though, in point of fact, it can no more properly be considered so than an affluent of Lake Superior could be called the St. Lawrence, or a stream running into Lake Itasca called the Mississippi. Mr. Stanley has not merely thought fit to change the name of the Kageera River into that of the 'Alexandra Nile,' but to assume that he has discovered the source of the Nile in a lake which Captain Speke has delineated in his map as Akenyara, and he has changed the name of this lake into 'Alexandra Nyanza.' Mr. Stanley does not seem to be aware that it is not according to polite usage for explorers to give names to lakes which they have not visited, if they figure on the maps of former travellers, and still less to change names of rivers which have been previously discovered and carefully laid down." Mr. Stanley, in his letter, says that he has not the works of Speke with him; upon which Mr. Oliphant observes that if he had not neglected to provide himself with the only description in existence of the region he proposed to explore, "he would have avoided the grievous error of supposing that he was making important geographical discoveries, or adding in any essential particular to the information which had already been obtained by Speke."

"Mr. Stanley gave us an admirable account of this region a year ago, in a letter dated April 1876" (see our number for September 1876), "where he casually mentions Akenyara as a lake 30 miles by 20, and entirely confirms Speke's account of the drainage of this range. He has never revisited the scene of his exploration since then, and why we should now be favoured" (see our number for May 1877, p. 124), "as a sort of second thought, with a map and a theory which are both so improbable, it is difficult to imagine, unless it be that each letter he sends home must be a discovery. First we have the Shimeeyu as the source of the Nile discovered by Stanley in 1875; now we have the Kageera source discovered in 1876; and it is to be supposed that as the public demand for Nile sources increases, Mr. Stanley will be called upon to supply them."

Passing to the Tanganyika, Mr. Oliphant thinks "that the map, which Mr. Stanley has sent home, of the Lukuga Creek, as the result of his personal examination (see our number for May 1877, p. 124), is as valuable as the imaginary one of Akenyara is worthless; and although we may not altogether accept his conclusions, they are ingenious, and open a wide field for conjecture." Mr. Oliphant's conclusion, which he arrives at after a very interesting discussion of the question, is that the Tanganyika Lake occasionally overflows by the Lukuga outlet, and thus, from time to time, discharges into the Congo. This great discovery of Commander Cameron was fully explained in our number of March 1876, and the conclusion we arrived at was the same as that of Mr. Oliphant.

* *African Explorers*, by Laurence Oliphant. In the *North American Review*, May-June, 1877, IV., p. 383. (Trübner & Co.)

GEOGRAPHICAL SCHOOL BOOKS.

HISTORY PRIMERS. Geography. By *Geo. Grove, F.R.G.S.* (Macmillan.)

STEWART'S LOCAL EXAMINATION SERIES. The Book of Physical Geography. By *Keith Johnston, F.R.G.S.* (W. Stewart and Co.).

HISTORY PRIMERS. Classical Geography. By *H. F. Tozer, M.A.* (Macmillan.)

THE compilation of geographical school-books too frequently is intrusted to persons who, whatever qualifications they may possess as teachers, are hardly in a position to keep abreast of the rapid progress that is being made in every department of geographical inquiry. Teaching and learning should certainly go hand in hand, but our geography teachers, we are afraid, are too frequently absorbed by other branches of instruction, and, in their case, small handbooks, embodying the results of most recent research, are doubly useful. The books now under notice are well calculated to meet this want. It is rarely we have read a more attractive treatise than Mr. Grove's Introduction to Geography. In a hundred and twenty pages the author explains the scope of geography, teaches the use of maps, and treats lucidly on some of the most striking phenomena of physical geography, illustrating his meaning by capital diagrams. Mr. Johnston's "Book of Physical Geography" fully bears out the author's reputation as a painstaking and conscientious geographer. The multitude of facts with which he has to deal is arranged in a perspicuous manner, and it only needs the perusal of a few pages in order to find out that we are presented with the results of a study of original authorities, and not with contents of some pre-existing larger work, boiled down to the dimensions of a school-book. The work is illustrated profusely with maps and diagrams.

Mr. F. Tozer's "Classical Geography" is equally good in its way. We are glad to find that the author does not confine himself to a bare enumeration of countries, towns, and mountains, but draws attention, on every suitable occasion, to the influence exercised by geographical surroundings upon a nation's destinies. If the teachers for whom this little work is intended are capable of acting in accordance with the author's intention, they will impart life and interest to lessons which, where confined to a mere recapitulation of names, always prove exceedingly repulsive.

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SPON'S INFORMATION FOR COLONIAL ENGINEERS: INDIA. By *F. C. Danvers, Assoc. I.C.E.* (London, 1877.)

THIS little work is designed to supply general information of value concerning India to those who contemplate a career in the Public Works Department in that country. It opens with a brief description of the geography and physical condition of the country. We have then an account of the different building materials available in the various provinces of India, including bricks, cement, and timber. A brief account of roads, bridges, and railways follow, with particulars of the cost per mile of some of the chief of these in India. A chapter on irrigation describes the four classes of irrigation works in India, viz., inundation canals, irrigation canals, canals in river deltas, and tank irrigation. The chapter on lighthouses contains particulars concerning the construction of some of the chief of these structures. A reference to the recent complete list of lighthouses and ships recently published by the Government of India, would have here been useful. In appendices we find particulars respecting the rules of the Public Works Department; next a list of the principal trees in India, with notes respecting their suitability for building purposes; and, lastly, a list of Indian weights and measures, and a glossary of native terms. There are a very few blemishes in the work which we have noticed in glancing through. For instance, in treating of the physical geography of India, this is discussed with reference to the administrative divisions, which make it appear that Mysore and Coorg are not in the Madras Presidency. There is some confusion, too, in the way in which Bengal is spoken of, it not being apparent what portion of country is meant by it; the Salwen is omitted from the list of rivers of British Burmah, and Dodabetta instead, one of the Anamallay peaks, is spoken of as one of the highest mountains of Southern India. But these are minor matters, which cannot detract sensibly from the usefulness of the work, which will be appreciated by embryo Indian civil engineers.

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BRIEF ACCOUNT OF THE ROYAL FOREST SCHOOL AT VALLOMBROSA. By *Hugh Cleghorn, M.D.*

FOREST conservancy is now an important department of administration in most of the countries of Europe, including even Spain, and the details of the arrangements that have been adopted by the various governments are very interesting. As regards geography, forest administration is important, in connection with the effect of human agency on the physical condition of the earth. Italy, like most other countries, has suffered from the wasteful denudation of her formerly wooded tracts to the detriment of the climate, to the poverty of the country, and to the marring of her beauty. Dr. Cleghorn gives an account of the steps she has taken to regain the damage done in previous centuries, having in May 1875 visited the forest school and estates at Vallombrosa and Paterno in the Apennines, about 30 miles from Florence. Paterno is 1215, and Vallombrosa 5556 feet, above the sea. In 1867 the present Director, Cav. Adolfo di Bérenger, was appointed to organise and superintend the forest school. The school was formally opened in August 1869, and now has a Director and five Professors, a library of 2000 volumes for forest literature, two arboretums, plantations, and nurseries. Dr. Cleghorn gives an account of the course of study for the pupils, and other particulars respecting the Vallombrosa establishment. The official organs of the school are the *Giornale di Economia Forestale* and the *Bollettino Forestale*, both published at Florence.

Cartography.

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SINCE Siebold and Arrowsmith published their Maps of Japan our knowledge of that country has been much increased, and the interest taken in it is no longer dictated by curiosity only, but is due, in a large measure, to commercial transactions on a large scale. Mr. Brunton's map of these "British Islands" of the Pacific* meets, therefore, a real want. The author has been Engineer-in-Chief of the Japanese Lighthouse Department; he has seen much of the country, and his official position rendered accessible to him many sources of information, which are not as a rule available. This map is mainly based upon British Admiralty surveys, and a large number of native maps. The explorations of European travellers have likewise been consulted, but they furnished but comparatively little information, as the interior of Japan has not hitherto been as accessible as might have been supposed from the eagerness with which the Japanese have introduced a good many European institutions. The map cannot, therefore, compare in accuracy with our delineations of European countries. There is, more especially, a great lack of altitudes, but it is, nevertheless, a vast improvement upon older maps. It is, in fact, the only map of Japan which can be consulted with confidence. The names

* Nippon (Japan), 1876, compiled by R. Henry Brunton, C.E. 4 sheets. Scale, 20 miles to the inch. London (Trübner & Co.), 1877.

of places have been spelt in accordance with the phonetic system adopted by Japanese scholars, and they have been revised by Mr. Satow, the interpreter of the British Embassy. We hope the Admiralty will take a note of this fact, and accept the same mode of spelling for their charts. Naval officers cannot, indeed, be expected to have a thorough knowledge of the languages of the countries which they are ordered to survey, but competent scholars should in all these cases be consulted, in order that the correct names may be ascertained, and annoying confusion in our geographical nomenclature may be avoided.

Mr. Brunton's map shows railways in operation and proposed, high-roads, bye-roads, telegraphs; towns, which were formerly the residence of nobles; capitals of the kens, or districts, and the boundaries of these latter. Appended to it are several valuable statistical tables. From these we learn that the area of Japan is about 150,000 square miles (a more exact determination of the area of each ken would have proved acceptable), and its population 33,211,093 souls. There are 70 miles of railway and 2760 of high-roads. At the seven towns open to foreign trade (Yokohama, Hiogo, Ozaka, Nagasaki, Niigata, Hakodate, and Yedo), there resided, in 1875, 2581 Europeans and Americans. The value of the imports was 29,467,067 dollars, and that of the exports 18,014,890 dollars. The revenue of the empire for 1875-6 was estimated at 68,600,000 dollars; there was paper money in circulation representing 94,800,000 dollars; and the national debt had grown to the respectable sum of 142,300,000 dollars.

MR. J. KIPS has compiled a map showing the Roman Catholic Dioceses, Churches, Convents, and other religious institutions throughout Great Britain. He appears to have done his work conscientiously. These institutions are of course most densely packed together where Irishmen most do congregate, but there is hardly a county without its Roman Catholic religious establishment, and convents appear to have been placed by preference in localities where there are no Roman Catholics at all.

MR. STANFORD has published an excellent Map of Turkey in Europe, &c., which embraces the whole of the countries surrounding the Black Sea, the Eastern Mediterranean, and the Caspian Sea, and will enable the readers of newspapers to follow the operations of the contending armies in Europe and Asia. The names are printed legibly, and spelt, as a rule, consistently with the rules almost universally adopted by English geographers. A "Popular Map," issued by the same firm, supplies hardly more information than may be found in an ordinary atlas. Jankowsky's "Russo-Turkish War Map" (Stanford) is one of those attempts at pictorial delineation of a country which must be done well and characteristically to give satisfaction. Mr. Jankowsky's map can hardly be said to be a satisfactory performance, and we should certainly give the preference to an ordinary map.

THE *Illustrated London News* has begun the publication of a series of war maps, several of them drawn on a large scale. Maps of the Lower Danube and the Dobruja, of the Seat of War in Asia, the environs of Kars, the Danube and the Balkans, and the Black Sea have already been published.

THE DRAINAGE MAP OF COLORADO, first published by the United States' Department of the Interior, affords evidence of the progress making in the geological and geographical survey of the territories now carried on under the superintendence of Professor F. V. Hayden. The primary triangulation was conducted by Messrs. J. T. Gardner and A. D. Wilson: for the topography we are indebted to Messrs. Wilson, J. R. Bechler, H. Gannett, J. B. Crittenden, and S. B. Ladd. The map is drawn on a scale of 12 miles to the inch, and we need hardly say that it contains much that is new. The rivers, printed in blue, are the most prominent feature; but roads, settlements, and trigonometrical points have likewise been inserted, and although the hills are not shaded, numerous altitudes afford some idea of the features of the country. The following are the culminating summits:—

Long's Peak, 14,271 feet; Mount Evans, 14,430 feet; and Pike's Peak, 14,147, in the Colorado or Front Range.

The Spanish Peaks, 13,620 feet.

Mount Powell, 13,398 feet, and Mount Lincoln, 14,286 feet, in the Park Range.

Mount of the Holy Cross, 14,176 feet, and Massive Mount, 14,368 feet, in the Sawatch Mountains.

Blanca Peak, 14,464 feet, in the Sangre de Cristo Range.

Maroon Mount, 14,000 feet, in the Elk Mountains.

Uncompahgre Peak, 14.236 feet.

Pidgeon's Peak, 13,928 feet, in the San Juan Mountains.

Mount Wilson, 14,280 feet, in the San Miguel Mountains.

Log Book.

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Promotion of Dr. Colan.—On the return of the Arctic Expedition, after achieving a great success, and securing most valuable scientific results, the usual promotions took place among officers and men, those of the officers being gazetted on November 3rd, 1876 (see our number for December 1876, p. 335). Dr. Colan, the Senior Medical Officer, was to be promoted to the rank of Deputy Inspector of Hospitals and Fleets; but in this grade it is necessary to wait for a vacancy, which was soon about to occur. Last April his promotion was also gazetted. We heartily congratulate this distinguished medical officer on the recognition of his services. To his professional skill, and, even more, to his incessant care and watchfulness, gentle, sympathetic kindness, and admirable nursing, the rapid and complete recovery of the men attacked by scurvy is due. Dr. Colan always acted in perfect accord with Captain Nares, and formed a popular member of a most united and happy mess.

The necessary delay in the announcement of this promotion has been used as a means of shameful misrepresentation, and of several false insinuations by unscrupulous writers, who have vainly striven to depreciate the admirable work of the Expedition. Praise such as has been bestowed on Dr. Colan, with the object of injuring his chief, must have been far more annoying to him than abuse. He formed one member, cordially acting with the others, of the most united Expedition that ever crossed the Arctic Circle.

Baku as a Central Point of the Overland Route to India.—The *Russische Revue* (Part II. of 1876) gives an important paper on the above subject by W. Fabritius, of Helsingfors University. The chief point on which the argument hangs is one which appears in the latter part of the article, *i.e.*, that a *great circle* traced from any point whatever in Central Europe to Central India will intersect or pass near the Caucasus, and that, therefore, this route offers the shortest line for railway communication between the two places mentioned. In the first part of the essay the importance of the natural resources of the shores of the Caspian are cited, viz., petroleum, sulphur, white naphtha from Cheleken; timber, cotton, rice, and madder from Daghestan; lime and gypsum

from Krasnovodsk; and, lastly, carpets, mats, and embroidered cloth from the Persians and Turkomans. A geographical sketch of the Caucasus, with its stupendous mountain barrier to the north, is given, and the disadvantages of Tiflis, which is situated in a sort of *cul-de-sac*, surrounded by mountains, are shown. Neither the Georgian road nor the Poti railway, both in themselves far from successful public works, can possibly redeem the bad position of Tiflis, which is anything but accessible from Europe. Baku, on the other hand, can be reached in one, two, or three days' journey from Astrakan, Petrovsk, Derbent, Gurieff, and other chief points along the Caspian. A railway from Baku across the Apscheron peninsula to Vladikavkaz and Rostov would encounter no great physical difficulties along its course (435 miles), and would prove of great benefit in uniting Trans-Caucasian regions to the Russian system. From Baku southward, M. Fabritius would carry the railway along the shore of the Caspian up the Sefi-rud and across the mountain range by way of Kazvin and Kum to Teheran, thence to Ispahan, and afterwards south-east to Bender Abbas, from whence it would bend southwards for about 100 miles, and then, turning eastward, follow the almost straight coast of Beluchistan, ultimately joining the railway system of India at Fort Manura on the Indus. The total length of such a line from Baku would be 2200 miles. The author considers that the only important obstacles would occur in the ascent up the valley of the Sefi-rud to the Persian plateau, and the descent to the coast. The safety of the line in Belooch territory would be secured by constructing it sufficiently close to the coast, and stationing a few ships of war in the Arabian Sea.

The Darien Exploring Expedition.—The expedition, under command of M. Lucien N. B. Wyse, of which we gave an account in our number for February, p. 45, returned to Panama early in April. No details respecting the surveys have yet been made public; but M. Wyse has expressed his conviction, based on the results of these surveys, that the inter-oceanic canal will soon be made through Colombian territory.

Colombia.—We rejoice to hear that the civil war in the United States of Colombia has come to an end. It was fomented by the priests, and its object was to prevent the establishment of a sound system of education. For this end the unfortunate country has been suffering all the evils of war since last July. Fortunately, the Government has at length succeeded in entirely defeating the insurgents, and restoring order. The rebellion, instigated by the Bishop of Popayan, began in the State of Cauca, and the first blood was shed in Palmira on the 10th of July, 1876. On the 31st of August, General Truxillo defeated the rebels in the battle of Los Chancos, and on the 6th of April, 1877, the insurgent Governor of the State of Antioquia, Silverio Arango, capitulated at Manizales. This ended the war. It is worthy of note that there has never been a successful revolution in Colombia since the independence, and that, when legitimate authority has been attacked, it has always successfully held its own. General Truxillo will probably be elected President of Colombia at the expiration of the term of office of Dr. Parra, the present Chief Magistrate, in March 1878.

Correspondence.

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THE KANKALIS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

DEAR SIR,—In my last letter I discussed the question of the ethnology of the Pechenegs, whom I ventured to identify with the Karakalpaks. I omitted to refer to the old English traveller, Bell, of Antermony, who mentions that the Karakalpaks, in 1715, still inhabited the deserts east of Samara, and that they could muster altogether about 10,000 or 12,000 men (*op. cit., in Pinkerton*, vii., 279 and 280). Three of the tribes of the Pechenegs, according to the Emperor Constantine's account, belonged to the race of the Kankar. With your permission, we will now consider the history of this very interesting race.

The name, as we shall see, occurs in several forms. Rubruquis calls them Cangle, and he connects them closely with the Comans—"Comani qui dicebantur Cangle," "Cangle quœdam parentela Comanorum," are two of his phrases (*op. cit., ed. Soc. de Geogr.*, 265 and 274). Plano Carpini, who calls them Cangites, tells us merely that their land lay east of that of the Comans, and that they entered it on the 16th of April and left it on the 17th of May, being thus thirty-one days in crossing it. On leaving it they entered the land of the Bissermans or Musselmans (*op. cit., ed. D'Avezac*, 749). In the narrative of Brother Benedict, we read that Comania extended as far as the Yaik, where the land of the Cangites commenced, and reached as far as Turkya or Turkey (*id.* 777). Rubruquis tells us that the land of the Cangle began at the Volga, and that he was travelling through it from the feast of Holy Rood to that of All Saints (*id.* 274 and 276).

Having defined the western limits of the Kankalis at the time of the great Mongol invasion, let us now turn to the eastern frontiers. In the account given by Raschid and others of this invasion, we find the Kankalis occupying the lower courses of the Jaxartes, and the country bordering the Sea of Aral on the north and east. They were subject to, or, at least, dependent upon, the Khuarezm Shah Muhammed. This dependence commenced when Takish the father of Muhammed married Turkan Khatun the daughter of the Kadr Khan of Kipchak (*Tabakat-i-Nasiri*, 254). The latter is called Akran, or Ikran, by the author of that work (*id.*, 240). D'Ohsson calls him Jinkeshi, and tells us he belonged to the tribe Bayaut. According to the biographer, Muhammed, of Nessor, the Bayauts were a section of the Yemeks, and D'Ohsson says the Yemeks were undoubtedly comprised under the generic name of Kankalis (*Histoire des Mongols*, i., 196 and 197). She was a person of very great power and consequence, and was styled Khudawandah-i-Jahan (Princess of the Universe) (*Tabakat-i-Nasiri*, 241). In her suit many of her relatives passed into the service of Muhammed, and with them large bodies of the Kankalis. They were planted as garrisons on the frontier. Thus one of them named Inaljuk, and who was entitled Ghair Khan, which is probably a corruption either of the Gur Khan or, as the author of the *Tabakat-i-Nasiri* makes it, of Kadr Khan, was, according to Abulghazi, given the government of Turkistan. He had his capital at Otrar; he was the son of the younger brother of Turkan Khatun's father, and, therefore, her cousin, and we are told the title of Ghair Khan was conferred on him by Muhammed (*op. cit., ed.* Des Maisons, 37). Khumar Tikin, the brother of Turkan Khatun, who, like Ghair Khan became a Musselman, was appointed darugha, *i.e.*, governor of Urgendy. Another leading Kankali, named Kuk, was given the command of Bokhara (*id.*, 37 and 38).

The Kankalis formed the greater part of the garrison of Samarkand, and were put to death there to the num-

ber of 30,000, with their chiefs Barishanaz Khan, Togai Khan, Sarsig Khan, and Ulag Khan. (D'Ohsson i., 238 and 239). Amin Malik, the Governor of Herat, was Turkan Khatun's brother, and had a following of 20,000 Kankalis (*id.* i., 297). One of Muhammed Khuarezm Shah's wives was also a Kankali. She was apparently the mother of his son Arzalu Sultan (*Tabakat-i-Nasiri*, 279).

Altogether, according to Abulghazi, the number of Kankalis who took service under Muhammed Khuarezm Shah, was 50,000 or 60,000. Ten thousand families of Kankalis lived on the banks of the Chu and the Talas, but on the arrival of Chingiz Khan all those who lived on the Talas were conquered, and their country ravaged, and thus ended the separate history of the Kankalis (*op. cit.* 38).

It would, therefore, seem that the Kankalis, at the approach of the Mongols, occupied the whole country north of the Aral, from the Yaik to the Talas. They were very closely related to the Kipchaks, and seem, in fact, to have formed but a section of the same race. Thus, in the Tabakat-i-Nasiri, the name Kipchak is given to their country, and we know that, even at this day, one of the main divisions of the Uzbegs is called Kipchak Kangli.

Among the shreds of the Kankalis who escaped the Mongol arms was a small tribe called Kayi Kangli, which dwelt at Mahan, near Meru. On the Mongol approach, they retired westward into the district of Akhlatt, in Armenia. Eight years later when the Mongols appeared there, they again retired into Asia Minor. Their chief was named Ertogrul. He and his people, consisting of about 440 families, obtained the grant of a district near Angora, from the Seljuk Sultan of Rum, and he was given the title of Udj Beg, or Margrave. He was the father of the famous Othman, or Osman, the founder of the Ottoman Empire (D'Ohsson, i., 293 and 294). So that the Ottomans proper, the original nucleus of the race, were Kankalis. This leads us into a curious by-way of our inquiry, which I think interesting.

The Chinese, as De Guignes long ago showed, called the Kankalis, Kangkiu, which reminds us of the form Kangar, used by the Byzantines, and the Kangites of Carpini. Under this name they apparently included the Kipchaks and the Pechenegs. They tell us the Kangkiu were divided into nine small kingdoms, which reminds us that Constantine Porphyrogenitus tells us the Pechenegs were divided into eight Themata, and further, the names Tsao, Ho, and Su, which they give to three of their kingdoms, correspond to the three names *Tzo*pan, *Cho*pan, and Tzur. This has all been noticed by Von Hammer (*Geshichte der Goldenen Horde*, 6).

In Schmidt's criticism of the work just cited we are told that among all the peoples of Central Asia, Mongols, as well as Turks the Osmanli, to this day are known as Khangar (*id.* 608). This is a curious confirmation of the fact I have already mentioned, that the nucleus of their race was the small tribe of Kayi Kangli, who left Khorassan on the invasion of the Mongols. In a Paper by Dr. Schott, published in the *Berlin Transactions* for 1844, and entitled "Chinesische Nachrichten uber die Kanggar und das Osmanische Reich," we have some curious information on this subject. In a small Chinese book published in 1777, and entitled *Si in wen kian lo*, is a curious account of the Russians, who, we are told, were then governed by a female Khan. They are described as having been at war in the twentieth year of Kien lung, *i.e.*, in 1755, with the Kanggar, which Schott agrees with Schmidt is the name by which the Osmanli are now known in Central Asia (*op. cit.* 156). The account is very quaint in its details, and makes the war terminate by the Russians becoming tributary to the Kanggar, and having to submit to pay an annual tribute of 500 boys and 500 girls to the victors. All this is the manufacture of Chinese patriotism, nor does the date seem to be correct; but the account, as Schott says, doubtless refers to the war which the Empress Catharine fought against the Turks, in the years 1769 to 1774, and which ended in the peace so disastrous for the latter, secured by the treaty of Kuchuk Kainarja (*id.* 158.)

The Kankalis or Kanklis derive their name, according to Abulghazi (who was himself a Turk, and also according to Raschid), from the word kank, a chariot, cart, or araba (*ed. Des Maisons*, 17). M. Schott says, that among several tribes of Siberia a cart is still known as kanga, and he explains how naturally a Chinese would convert Kankli into Kangkiu, which is a similar change to the Latin *conclusum* when it becomes the Italian *conchiuso* (*op. cit.*, 154, note). Kangkiu, then, is the transcription into Chinese orthography of the name Kankali, but as Remusat long ago showed a tribe of Turks, famous in the Chinese annals, bore the name Kaoché, which in Chinese means the same thing as Kankli in Turkish (*Researches sur les Langues Tartares*, 315).

On turning to Dr. Bretschneider's admirable work recently published, entitled *Noticcs of the Mediæval Geography and History of Central and Western Asia*, we find it stated that Kaoché means high cart in Chinese, and he tells us further that in the history of the Wei (*i.e.*, in the fifth century of our era), the name of this people is explained by the high wheels they used to put on their carts. Now the character ché is also read kiu; and in the biography of Buhuman, who belonged to the Kankali tribe, and which is given in the Yuenshi, it is expressly said that the Kankali's derived their origin from the Kaokin, a people mentioned in the *History of the Han* (*op. cit.*, 74, note 143). This proof is conclusive, and enables us to carry back the history of the Kankalis to an early date. I hope to be permitted to trace the story further on another occasion; now, we must revert somewhat. Meanwhile, I would mention, as a fact of perhaps some interest to my friend, Colonel Yule, that Von Hammer says that the Chinese Kaoché is the same word as the Turkish Kochi, and the English coach (*Golden Horde* 17, note 2). I have sufficient sins of my own to answer for without being answerable for Von Hammer's etymologies, but this one certainly seems reasonable and interesting.

As I have shown, the Kankalis, at the time of the Mongol invasion, occupied the whole country from the Yaik to Turkestan. From the notice of Constantine Porphyrogenitus we gather that they were in this neighbourhood more than two centuries earlier. Now it is strange that we do not meet with the name in the pages of the earlier Arab geograpers; so strange, that we are led to inquire whether the race was not known to them under some other name. On turning to Edrisi, the Nubian geographer who wrote in the 12th century, we find the following passage:—"To the east of Lake Aral is the country of the Kandaghases, brave and independent tribes of the Ghoz race" (*op. cit., ed.* Jaubert ii., 339). There can be no doubt that the Kandaghases of this passage are the Kankalis of other writers, Edrisi's orthography being very corrupt. We therefore get on the track that the Kankalis, who were so styled indigenously, the name being a Turk name, were in fact no others than a section of the Ghoz of the Arab writers, and this is amply confirmed by what we know of the habitat and other idiosyncracies of the Ghoz.

The general name Ghoz included, as I believe, both the Kipchaks and the Kankalis. The former, as I argued in a former letter, only appeared in the steppes of the Kuma about the year 1050, and came from Armenia, and had reached there, along with other Ghoz tribes, who had invaded the west under the early Seljuki princes. The Kipchaks, before they crossed the Jaxartes, probably lived to the north-east of the Kankalis, somewhere near Lake Balkash. It is this eastern Kipchak to which Edrisi refers so very curtly in the 9th section of the 6th climate of his work under the name of Khafchakh (*id.* 416). It was thence, as I believe,

that those Kipchaks, who form such a notable element in the Uzbeg and Kirghiz Kazak confederacies, and who dominated until lately over large districts of Ferghanah, originally came.

I hope to continue the examination of the history and origines of the Ghoz or Oghuz in another letter. In conclusion, will you permit me to thank Professor Vambery for his courteous answer to my question. I notice that Dr. Schott, in the memoir already cited, gives the same etymology of the name Bajnak, or Pecheneg, that is given by Von Hammer. Strahlenberg, in his quaint old book, derives the name from Pech, or Piech, which he says is the literal translation of Hund, a dog, and connects them with the Hungarians. May I ask M. Vambery another question? In working out the topography of the country of Ghoz, I have been very much puzzled to find the site of Jund, or Jend, a famous town very often mentioned in the history of the twelfth century, and captured by Juchi, the son of Chingiz Khan. I notice that M. Vambery in his *History of Bokharah*, says, "About the same spot now occupied by Gidjdovan, lay the considerable town of Jend, the frontier fortress towards Khuarezm" (*op. cit.* xxvi.) I cannot find this place Gidjdovan on my maps, and should like to know its whereabouts; and also M. Vambery's reasons for fixing Jund there. I cannot find in any of the passages where Jund is mentioned, and which are accessible to me, any definite information about its exact locality. Perhaps the question is discussed in M. Lerch's paper on the Archæology of the Valley of the Jaxartes, which it is a great pity is not translated. It would be a very welcome addition to your pages, and would not run over a great space.

I remain, yours &c.,

HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

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THE AMAZON AND ITS TRIBUTARIES.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the numbers of April and May of your magazine I have read a paper of Colonel Church, on the "River Purûs;" and a letter of Mr. Chandless, on "Barometrical Heights in the Amazon Valley." The two distinguished explorers differ as to the height of Manáos above the sea level; and as the question they raise is not without interest to science, I venture to make a few remarks on the subject.

Colonel Church gives a number of barometrical observations in his paper, made by various explorers; their results vary from 90 to over 1400 feet as the elevation of Manáos above the sea; and as such differences are clearly unsatisfactory, Colonel Church has virtually dropped these observations, preferring to level up the river to Manáos, taking for his guidance my observations on a similar great river. Colonel Church being aware that the inclination or fall of the Paraná is under half-an-inch per mile, thereon argues, I think correctly, that since the Amazon is the greater river of the two, its inclination would be probably less; that, accordingly, the height of Manáos, 1000 miles from the sea, would be under 500 inches, or under 42 feet. As a further proof of the gentle inclination of the Amazon's surface, Colonel Church states that the tide of the sea, not exceeding 12 feet at Pará, was observed 530 miles up the Amazon; while on the Paraná a similar tide is not perceptible 200 miles from the river's mouth (see *Hydraulics of Great Rivers*, Rosario Section). This seemed further to indicate that even half-an-inch per mile is an excessive estimate for the inclination of the Amazon.

Mr. Chandless disagrees in this respect from Colonel Church, saying "that Colonel Church seems to think even this height (92 feet) too great, because the tide reaches more than half way to Manáos, although the tidal rise at Pará is only 12 feet. But in this Colonel Church treats the tidal rise up a river as one of level only, neglecting the momentum; on which principle the tide ought to rise in the Bay of Fundy no more than it rises in the Atlantic outside."

Now, the comparison between a tidal wave entering the mouth of a river, and a similar wave entering a bay, does not hold at all. Moreover, the momentum of a mass in motion can only exert itself in the direction of the movement. Since, however, nobody suggests that the current of the Amazon is reversed by the tidal wave hundreds of miles above Pará, no "momentum" can possibly come into consideration; the mass of water rolling down the Amazon Channel towards the sea, and not the reverse way in the direction of the tidal wave.

That the tidal wave "apparently" travels up the Amazon some 500 miles from the sea, and that its effect is felt so far up the river, is due to another cause. The movement is, in reality, an oscillation of the river's surface in the vertical and not horizontal direction; and this oscillation is produced by the river. From the whole discharge of the river per second, that part is impounded in its channel—producing the vertical rise of its surface—which, on account of the rise of the sea at the river's mouth, could not be discharged at the time.

It does happen, on some rare occasions, that the current of a great river is reversed near sea, on account of an exceptional and sudden rise of a tidal wave, due to storms, &c. I once observed this within the Paraná, the current having been reversed at its mouth, and was reduced to zero some 60 miles higher up. At greater distances, however, the river flowed on, as usual, with its varying velocity, within its tidal reach, impounding water at one time and discharging it at the other.

In conclusion, allow me to say a few words about barometric measurements, upon which Mr. Chandless gave an interesting account from his own experience.

Under certain conditions, a barometer or an aneroid, in the hands of a skilful observer, are most valuable instruments. For small differences of level, say, up to 100 feet, the two localities under observation should be near each other—not over ten miles—if the observation is to be worth anything. As the difference in the levels become greater, so the distance between the two localities may increase without seriously affecting the result by atmospheric waves or disturbances.

I have meteorological weather charts before me, in which the sea all round Great Britain and Ireland is marked "smooth" and "very smooth;" sky cloudy; gentle currents of air almost in all directions. Yet, the atmospheric pressure was by no means the same at the surface of the sea—that is, not the same in the true horizon. There happened to be on that very day, over Great Britain and Ireland, steep "atmospheric gradients" of more than $\frac{1}{10}$ inch mercury within two points only 100 miles apart; so that, if barometric or aneroid observations had been simultaneously made at the two localities on that "apparently" favourable day, then the level of the sea at the one station would appear about 100 feet higher than at the other; whilst, on the next day, the atmospheric gradients may be reversed—now showing 100 feet depression instead of elevation. Both results would be wholly erroneous, yet they would be obtained from correct barometric observations.

I mention these facts to show that great caution is required in this kind of observation, if we are to receive information, and if we are not to be misled.

Yours, &c., J. J. RÉVY.

NOTE.—The maps which Mr. Saunders is preparing, to illustrate the defence of his views on the Himálaya Mountains, are too elaborate to be completed in time for our present number, but they may be expected in the next. The route of the Pundit Nain Singh from the borders of Ladak across the Hor Pa to Lhasa, and thence by Towang to Udalgiri, in Assam, will be included in one of these maps; and on that account Capt. Trotter's paper on that subject, read before the Royal Geographical Society on the 14th ult., is also postponed.

Proceedings of Geographical Societies.

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PARIS GEOGRAPHICAL SOCIETY.

March 21st, 1877.—M. E. LEVASSEUR in the chair. Sir Henry Rawlinson occupied a seat near the President. It was announced that the remains of the Marquis de Compiègne had been buried at La Chaise, the residence of his family.

Prof. MARRE DE MARIN announced the completion of a grammar and dictionary of the Malgash language.

M. ESTOURGIS communicated some details on a commercial and scientific mission which Messrs. Cockerill, of Seraing, had despatched to the Transvaal. M. Jaquemin, its chief, had returned to Belgium, with propositions for the construction of a railway from Delagoa Bay to Pretoria.

Lieut. A. DE BIZEMONT reported on the astronomical observations sent home by M. Savorgnan de Brazza. The furthest point referred to is N'gheme in Aduma, 1° 7′ 50″ to the east of Lope.

Dr. BROCK communicated particulars on the recent Norwegian exploration of the Northern Atlantic, between Norway and Iceland.

April 4th, 1877.—Baron DE LA RONCIERE LE NOURY in the chair. The President announced that a French committee had been formed in connection with the International Association for the Exploration of Africa, established at Brussels. Of this committee M. de Lesseps would be President.

Mr. WILLIAM HUBNER then read the Report of the Commission appointed for the consideration of the geographical labours entitled to receive the Society's prizes.

Commander Cameron, who was present, was awarded the Gold Medal of the Society, Captain Roudaire received likewise a Gold Medal; MM. Léon Pérrièr and de Folin received a Silver Medal for their works on the bottom of the sea; and M. Gabriel Gravier was awarded the money-prize founded in memory of M. de la Roquette, as an acknowledgment of the merits of his work on the Norman discovery of America.

M. E. ANDRE read a paper on his travels through Southern America in 1875-6.

The following were elected members of the Central Commission:—Baron de la Ronciére le Noury, President; Commandant Mouchez and M. E. Desjardins, Vice-Presidents; MM. Fournier and Bionne, scrutineers; and M. Julien Thoulet, Secretary.

April 18th, 1877.—M. E. LEVASSEUR in the chair. The President announced that they had determined to issue debentures, with a view of defraying the cost of erecting their own residence.

M. MAUNOIR read the correspondence received, amongst which were letters from the family of the late M. de Compiègne and the Committee of the Egyptian Geographical Society. In the letter it was stated that the most cordial relations existed between Dr. Schweinfurth and the deceased, up to the time of the latter's death.

The MINISTER OF EDUCATION announced that £400 had been granted towards M. Largeau's expedition.

M. GRASSET D'ORCET writes to say that he has been struck by the bearings of the Monument of Karnak being the same as those of Solomon's Temple, and its eleven rows of stones, which can refer only to the solar cycle of the Rudras, or to that of eleven letters on the vases of Hissarlik.

DR. A. MORICE proposes the establishment of a Zoological Museum, in which the animals shall be arranged according to countries, and not according to the present method.

M. HAVARD announces that the representatives of the *Chambres Syndicales* and of their own Society had constituted themselves as a *Comité de délégation géographique*, of which M. Cortambert was President.

The MINISTER OF FOREIGN AFFAIRS communicated a statistical notice on Trans-Vaal, which had been received from the French Consul at Cape Town.

M. H. DUVEYRIER read a paper on Stanley's Exploration of Lake Tanganyika and the Lukuga Creek.

Dr. E. Hamy read a paper on the Alfurus inhabiting the island Gololo, which had recently been visited by M. Raffray.

M. J. THOULET demonstrated the importance of the gnomonical projections.

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BERLIN GEOGRAPHICAL SOCIETY.

May 12th, 1877.—Baron RICHTHOFEN read a paper on the roads followed by the silk trade, according to Ptolemy and the Chinese authorities. A lively discussion ensued, in which Dr. H. KIEPERT and others took part.

The Delegates of the Society for the Exploration of Equatorial Africa were present at the meeting. It was announced that Dr. Nachtigal proposed to start for Western Africa next year. In the meantime, it is proposed to despatch a pioneer explorer, to follow in the footsteps of Pogge and Mohr. The expenses of this expedition will be borne conjointly by the old German African Association and by the German branch of the International Society.

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VIENNA GEOGRAPHICAL SOCIETY.

March 27th, 1877.—Baron HELFERT in the chair. General STEPHAN VON TURR read a paper on the proposed Darien Canal. The expedition organised for the examination of this project started in November 1876. It is commanded by Lieut. Lucien N. B. Wyse, assisted by Lieut. Reclus, Captain Bixio (since dead), Dr. Viquiez, Mr. Brooks, a geologist, M. Celler, and six engineers. On the 3rd December, 1876, the members of this expedition arrived at Panama, and, accompanied by M. Aizpuru, the President of the State, they started at once for Chapigana, on the inner bay of the Gulf of San Miguel, where their labours begun. This is a fine harbour, and Urabu, on the Atlantic coast, offers equal facilities. The proposed canal will have a length of 143 miles, including 46 miles of the Atrato and 43 of the Tuyra, which can be rendered navigable at small expense. At the confluence of Tuyra and Pucro the elevation above the sea is 92 feet, and it appears from a reconnaissance that the height of the water-parting at the head of the Tihule does not exceed 230 feet. Dr. Maack, who was attached to the American Expedition as Geologist, ascertained that the two oceans formerly communicated near this spot. The fossils discovered belonged to species still existing in the two oceans. The engineers would, therefore, only have to break through this barrier, which had been formed by an upheaval of the tertiary strata.

April 27th, 1877.—Dr. VON HOCHSTETTER in the chair. The Emperor of the Brazils was present at the meeting. The President, in welcoming his Majesty, stated that the Society was indebted to him for a valuable collection of geographical works on Brazils.

Dr. H. ABICH read a paper on volcanoes and earthquakes in the Caucasus.

Dr. O. LENZ then gave an account of his explorations on the Ogowe, Gabun, and Muni.

Lieut. WEYPRECHT explained the system of synchronous meteorological observations, which he proposed should be made at the international observatories which it was proposed to establish in the Arctic regions.

THE DANISH GEOGRAPHICAL SOCIETY.

WE have received the two first numbers of the Proceedings of the Danish Geographical Society (*Det Danske Geografiske Selskabs Tidshrift*), edited by the secretary, Professor Erslev. We have already announced the formation of this Society in November 1876, and we rejoice to see that it has already become a marked success. There are now 750 members, of whom 100 are ladies. His Danish Majesty is Patron, and the Crown Prince is President of the Society. The Vice-Presidents are Vice-Admiral Stein Bille, the distinguished officer who conducted the voyage of the 'Galathea' round the world in 1845-48; Count Holstein Holsteinborg; Rear-Admiral Irminger, the learned geographer and valued honorary correspondent of our own Society. Professor Erslev is Secretary; and among the Council are Professor Engelhardt, Captain O. Irminger, Professor Johnstrup, Dr. Rink, the learned Director of Greenland Trade, and Captain Rothe, the Hydrographer. The Society holds its meetings in an apartment of the Christianborg Palace.

At the first meeting, Admiral Irminger gave an account of the work and results of the late English Arctic Expedition; Mr. Hoffmeyer read a paper on the Meteorology of Greenland. At the second meeting, a very interesting paper was read, by Mr. J. C. Petersen, an Assistant in the Hydrographic Office, on the changes that have taken place in the Agger Canal, in the Limfjord of Jutland. It is illustrated by a map showing the state of the Agger Canal in 1695, 1791, 1849, 1855, 1867, and 1874. The first number also contains a paper entitled "Life in Omsk," described by Mr. E. Hansen, an official of the telegraph station. Dr. Rink contributes a paper, on the Present Condition of Greenland, to the second number; which also contains an account of the Nicobar Islands, by Admiral Stein Bille, who visited them during his voyage in the 'Galathea;' a paper on the proposed canal through the Darien Isthmus, by Professor Erslev; and another entitled "Sketches from Siam," by Captain A. de Richelieu, of the Siamese navy, who is an excellent surveyor. He has recently supplied Captain Taylor, our Superintendent of Indian Marine Surveys, with a valuable survey of Junk Ceylon. Each number also contains numerous short geographical notices, and is illustrated by neatly lithographed maps.

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ITALIAN GEOGRAPHICAL SOCIETY.

February 23rd, 1877.—An important meeting was held, at which an unusual number of members and visitors were present. Among these were Senators and Deputies of the Italian Parliament; Generals Longo and Garneri; the ex-Minister of Foreign Affairs, Marchese Visconti-Venosta; the Marchese Guenieri-Gonzaga, and other persons of note.

His Royal Highness Prince Humbert came in punctually at eight o'clock, accompanied by his chief aide, General de Sonnaz, and was received by the President of the Society, Signor Commendatore Correnti, and the following members of the Board of Direction:—Messrs. Maraini, Allievi, Garavaglia, and Guastalla. The chief guest of the evening, His Majesty the Emperor of the Brazils, did not, however, exhibit an equal respect for the princely virtue of punctuality. He did not make his appearance until nine o'clock, when, despairing of the Emperor's coming, the evening's proceedings had been commenced by the reading of a paper commemorative of the lately deceased Milanese traveller, Enrico Besana.

Signor ADAMOLI dwelt upon the immense services to modern science and commerce rendered by the laborious life of research led by Besana,—the story of which should serve as a powerful stimulus to the youth of Italy to complete the work he had initiated.

After stating the various donations lately received by the Library, the President thanked the Emperor for the honour of his visit to their Society, and took up the subject of Signor Adamoli's discourse. He offered ample testimony to Besana's merits as a patriot and an explorer, and explained that if his fame were not already widely spread, this was solely attributable to the retiring modesty of the man himself, who had ever shrunk from notoriety and remuneration.

The Society, now entering upon its eleventh year of existence, has 2200 Associates, 120 of whom are life-subscribers. The interest shown in the African Exploring Expedition, and in the late journey round the world, and the works last published by the Society, evidenced, said Signor Correnti, the rapid increase of geographical studies in Italy.

After defending their Society from the accusation of lukewarmness and indifference, the President explained the motive for establishing a station at Ankober, as proposed by the Brussels International Congress; and announced the constitution of an Italian Committee, presided over by Prince Humbert.

Signor Correnti stated that the departure of the second Expedition into Central Africa was fixed for the 6th March, and that Captain Martini would be conveyed to Zeila by an Italian man-of-war.

March 11th, 1877.—At the Conference held this day by the Italian Geographical Society, the members and visitors received with every token of due sympathy and respect the brave Italian traveller, Signor Romolo Gessi, the latest explorer of the Lake Albert Nyanza. The Society's rooms were crowded, even more than usual, by persons of note in science, literature, and politics.

The President opened the proceedings by stating the result of the Society's efforts respecting the first and second exploring expedition into Africa, and how the latter had just gone out under the special protection of the King and Government, assisted further by contributions from the entire nation. Signor Correnti pointed out the important scientific questions this expedition might be expected to solve satisfactorily.

He then passed a fervent eulogium on Signor Gessi, General Gordon's lieutenant, and indicating by a gesture General Türr (who was present at the meeting, and spoke later on of the vast undertaking regarding the Isthmus of Panama), the President said:—"Here we have another enterprising and indefatigable Italian—I may well style him such, with your permission, since he bore with pride, even in his own glorious land, the name and affection for a country, his not simply by adoption, but even historically.

Comm. CORRENTI next summoned a general meeting of the members for the 25th March, adding that this had been delayed in consequence of the labours involved by the preparations for the second expedition into Africa.

Signor GESSI himself then addressed the assembly, spoke at length of his journey to the Albert Nyanza, and spoke in terms of the warmest admiration of Gordon, his illustrious general. He concluded his interesting discourse by sending brotherly greeting to the Italian Expedition into Central Africa, promising to do all in his power to meet the party in the regions to the east of the Victoria Nyanza.

NOTICE.

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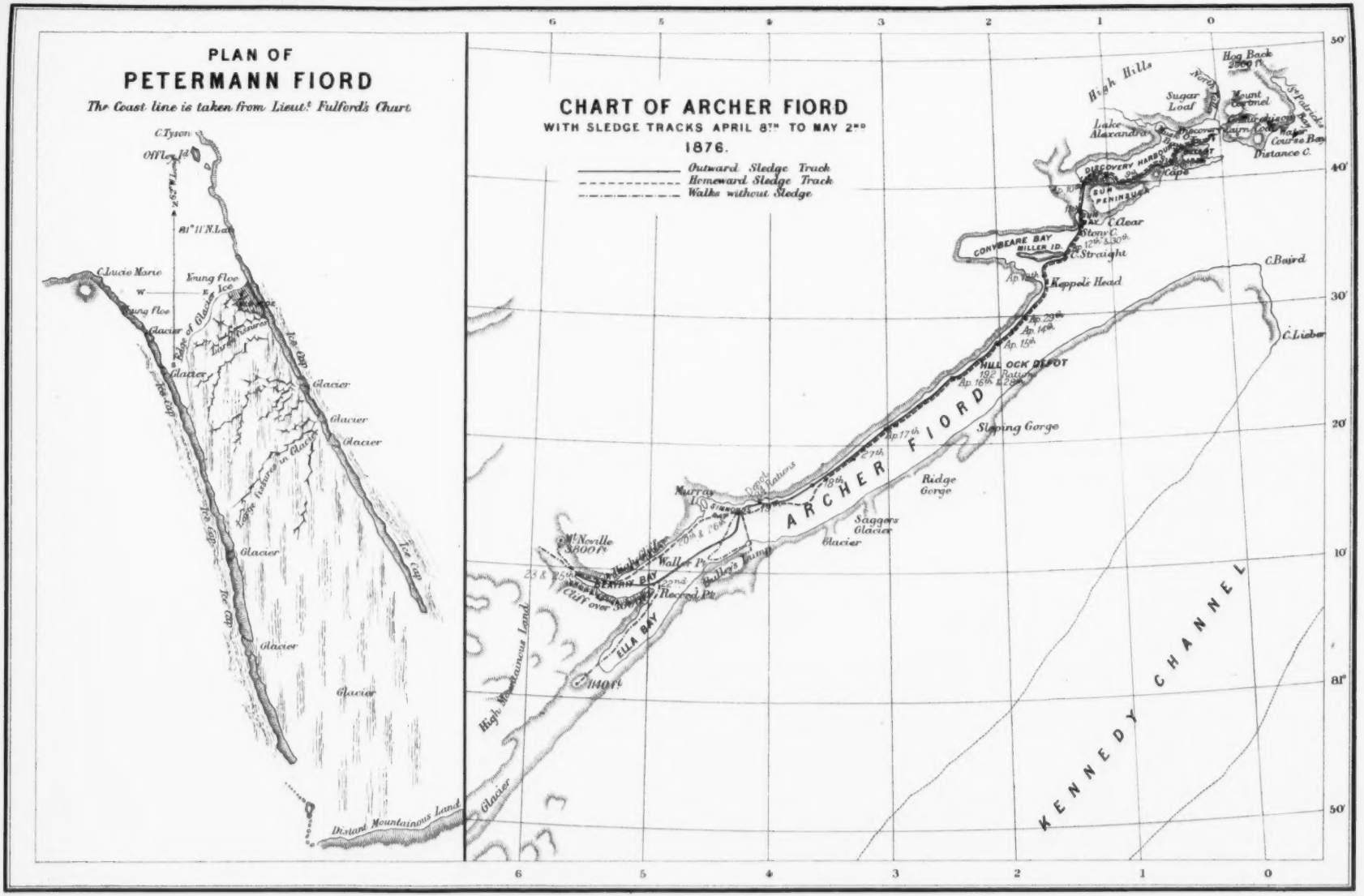
Annual Subscription and Postage, £1, Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co., 57 & 59, Ludgate Hill, London, E.C.


PLAN OF
PETERMANN FIORD
The Coast line is taken from Lieut.s Fulford's Chart
C.Tyson
Off Ice
81° 11' N.Lat.
C.Lucie Marie
Young Floe Ice
Young Floe
Glacier
Edge of Glacier
Ice Cap
Glacier
Glacier
Glacier
Ice Cap
Ice Cap
Glacier
Glacier
Distant Mountainous Land
CHART OF ARCHER FIORD
WITH SLEDGE TRACKS APRIL 8TH TO MAY 2ND
1876.
Outward Sledge Track
Homeward Sledge Track
Walks without Sledge
High Hills
Hog Back 2500 ft.
Sugar Loaf
Mount Carmel
St Patrick's
Lake Alexandra
DISCOVERY HARBOUR
Cape
SUN PENINSULA
C.Clear
Stony C.
CONYBEARE BAY
BILLER ID.
C.Straight
Keppel's Head
C.Baird
C.Lieber
HILLOCK DEPOT
Slipping Gorge
ARCHER FIORD
Ridge Gorge
Saggers Glacier
Glacier
Murray I.
Mt Neville 5800 ft
Waller Pt.
BERRY BAY
Cliff over 3000 ft
Record Pt.
ELLA BAY
Inuit
High Mountainous Land
KENNEDY CHANNEL
Course Bay
Distance C.